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ARCHIVES OF OTOLARYNGOLOGY

VOLUME 4 NOVEMBER, 1926 NUMBER 5

EXTERNAL OPERATION ON THE ETHMOSPHENOID-FRONTAL GROUP OF SINUSES UNDER LOCAL ANESTHESIA

TECHNIC FOR REMOVAL OF PART OF OPTIC FORAMEN WALL FOR RELIEF OF PRESSURE ON OPTIC NERVE

EDWARD CECIL SEWALL, M.D.
SAN FRANCISCO

The prevalence of sinus infection and its relation to other serious pathologic conditions make its recognition and treatment one of the most interesting and important problems in medicine.

ETIOLOGY.

Although a small proportion of antral infections are of dental origin, in the great majority of cases the sinus disease is the result of what is popularly known as the "common cold." There is considerable confusion in the lay mind and even in medical literature with regard to "colds."

I quote from Osler, 1925 edition, under "Relation of Common Colds to Influenza": "Much confusion must obtain in the classification of the acute upper tract infections until their cause is determined.

"At present, it is necessary to regard as 'colds' the relatively mild, recurrent, self-limited, catarrhal inflammations of the upper air passages, habitually and widely prevalent and of greatly increased incidence during the colder months of the year. Endemic prevalence and the high rate of morbidity obscure the relation in origin as one case to another, but rapid spread through groups of closely associated individuals suggests infection from person to person.

"Certain persons are insusceptible, while others suffer repeated attacks in rapid succession. Transient immunity probably follows an attack.

"The common cold so closely resembles uncomplicated pandemic and epidemic influenza as to suggest that the two diseases may be due to a common cause. The cause of influenza probably maintains its existence in interpandemic periods by constant passage from person to person and perhaps in the endemic acute coryzas, until under suitable lowered population immunity in some locality, its invasive properties, enhanced by selection through repeated transfers, make possible another pandemic."

This opinion is reflected through the textbooks, and describes the common cold as an acute self limited disease. I should like to call attention to certain passages in the foregoing quotation in order to emphasize disagreement with them. Osler says, "certain persons are insusceptible while others suffer repeated attacks in rapid succession." I do not believe that any one ever suffers repeated attacks, as inferred by that statement. I would also demur to the opinion expressed that "transient immunity probably follows an attack." I believe that a certain definite immunity always follows an acute attack when complete recovery has taken place, and this immunity lasts usually from six months to a year. I think an important error is constantly being made in not distinguishing between "acute colds" and subacute or chronic sinus disease. When so-called colds occur in rapid succession, one is dealing with subacute or chronic sinusitis.

PATHOLOGY

It is recognized that the accessory nasal sinuses open into and are a part of the nasal cavities. They are lined by slightly modified nasal mucosa, which extended into them as they developed. Therefore, the mucous membrane of the sinuses usually partakes of the diseases and inflammations of the mucous membrane of the nose. Attacked acutely by bacteria, the tissues of the nose and accessory sinuses react in a more or less characteristic manner. The vessels become dilated; the tissues become engorged and profuse secretion takes place, both from increased activity of the glands of the mucosa and as a result of extravasation from the blood vessels. The congestion may become so active and the process so virulent that blood appears in the secretion, either from diapedesis or rhexis.

When drainage of the sinuses into the nose is sufficient, little accumulation takes place in them and the acute attack runs a mild course. Inflammation gradually subsides, and the nose and adnexa return to normal in a few days. In case drainage is inadequate, a chain of pathologic sequences follows, often ultimately leading to the establishment of chronic tissue changes. In the course of this, eventually, pain may be experienced whenever the pressure of discharge in the sinus becomes sufficient. Just how this pain is produced is not well understood. Sometimes it seems out of all proportion to the amount of discharge and may occur at a more or less distant point. Neuritis or neuralgia, or "reflex" are terms used to describe what may be only partly comprehended. Occasionally, local inflammation may develop to the degree at which abscess or perforation of one of the walls of the sinuses threatens. Such perforation of the bone is uncommon because of the blood supply to the outer bony wall.

Inadequate drainage may depend on the fact that the ostia are small at best, and are not always placed at the most dependent part of the cavity. Though large enough under most circumstances, the swelling of their mucosal edge, or the presence in the sinus of thickened tissue makes them insufficient to their task. Also as important is the freedom of the nasal chamber into which they drain. Lack of room in the nose to receive the discharge is as bad as inadequate ostia. The common causes of such wholly or partially occluded nasal chambers are deviation of the septum, adventitious tissue about the turbinates due to such factors as enlarged tonsils and adenoids, or possibly to allergic irritation. In this connection must be mentioned the frequently described "vicious circle" that is established in sinus infection. When on account of inadequate drainage the acute sinus infection fails to heal, the mucous membrane meets the situation in a characteristic manner. In response to repeated insult or irritation, the fibrous structures of the mucous membrane undergo hypertrophy. This is the important factor in the development of what is commonly known as polypoid degeneration and polypi. The change may take place to a degree limited only by the nasal and sinus cavities. This tissue is frequently demonstrated in roentgen-ray pictures of the sinuses. Such tissue hypertrophy, occurring either in the nose or in the sinus, impedes the drainage and completes the "vicious circle." Such polypoid tissue, bathed constantly in secretions, tends to become edematous and "edematous fibroma" describes it histologically. The activity of the cilia, crowning the external layer of the columnar epithelium, may be affected by the virulence of the initial infection; they certainly are impaired in the later changes described. The overstimulated mucous glands are hypertrophic or cystic; furthermore, mucous membrane cysts containing pus may be formed by contiguity, and are an important argument for those who believe that all the mucous membrane of the sinus should be removed when the sinus is operated on.

SYMPTOMS

These are so varied and have been so frequently described that to enumerate them would be beyond the scope of this paper; suffice it to say that they are best considered as acute or chronic.

The manifestations of the acute disease are local and general. Discharge, pain, headache, nasal congestion and impaired respiration are among the more constant acute local symptoms. Malaise, chills, fever, leukocytosis and the occurrence of specific lesions in distant organs are the commoner acute general symptoms due to toxic absorption. Chronic sinusitis is evidenced by a more insidious and slowly progressive chain of local and general symptoms, as suggested by the pathology. Under the

local manifestations should be mentioned headache, or dull or dazed feeling in the head, inability to cerebrate or concentrate normally, anterior and postnasal discharge, nasal obstruction and sneezing. Under general manifestations may be mentioned various forms of neuralgia or neuritis, myositis, arthritis, malaise, neurasthenia, heart, kidney and skin lesions, anemias and blood changes characteristic of chronic intoxication. The symptoms caused by this chronic type of sinus infection are so diverse, and association with other diseased conditions of the body so open to question, that the problem is fascinating. Caution is advisable, to prevent the errors of diagnosis founded on over enthusiasm.

DIAGNOSIS

The diagnosis of acute or chronic sinus infection is not difficult, although the determination of the particular sinus involved may call for every resource. In an acute cold there is frequently profuse secretion. This discharge, thin and watery at first, gradually becomes thicker and more viscid and then often yellowish, and may even become purulent, greenish, foul and odorous. We are now dealing with sinusitis —acute, subacute or chronic. As the discharge is secreted from the lining mucous membrane of the nose itself, it is blown out easily or makes its way anteriorly or posteriorly out of the nose. Except under unusual conditions of nasal obstruction, there is no place in the nose proper for leukocytes to accumulate in sufficient numbers in the discharge to cause it to become yellow or purulent. So the rule may be postulated that yellow mucopurulent or purulent discharge from the nose practically always comes from accessory sinuses. The exceptions to this rule are not many and, if atrophic rhinitis is excluded, they are ruled out usually without difficulty.

This observation affords not only the rhinologist, but the clinician in every branch of medicine, a simple, easy method of tentatively diagnosing accessory sinus disease. I believe conversely that sinus infection almost always betrays itself by such yellowish mucopurulent or purulent secretion. I can conceive of hyperplastic processes taking possession of the sinuses to the exclusion of discharge. Such cases are in the large minority. Discharge and sinus infection are usually found together; it may be only watery in character for long periods, but if watched carefully, will usually at intervals show some yellowish discoloration. When well the nose is dry; there is normally no discharge. Evaporation keeps pace with secretion. There is no "dropping into the throat."

It is not always easy, however, to determine the presence or absence of such discharge. The statement of the patient is often unreliable, due to the erroneous idea commonly prevalent that nasal or postnasal discharge is normal. A careful search of the nose may be of no help

because the discharge is primarily not in the nose. For years, I have used a method of study that I think is reliable. Just as the urine is collected and gives an idea of the condition of the kidney, so do I have the patient collect the discharge that comes from the nose or nasopharynx on separate pieces of white cotton cloth. A piece of old sheet torn into squares answers better than gauze. The moisture will dry out, but the yellow or glairy mucus remains as a telltale of the true condition. Granting the practically constant association of discharge with sinus disease, attention is naturally turned to its localization as the first step in the working out of the diagnostic problem. The more discharge, the easier the task.

The location of the particular sinus involved is frequently not necessary in acute sinus disease. The condition is at first treated and often cured by general measures and the consideration of the condition as a whole. The virulence of the process, however, at times makes localization of the sinus or sinuses affected, essential. Pain, tenderness, redness and swelling are of importance in localization more frequently in acute than in chronic sinusitis. Otherwise, the problem presented of determining the source of the infection is solved on the same general lines in both acute and chronic sinus disease.

When the discharge contains a sufficient percentage of leukocytes to give a milky or yellowish or purulent color, the task is made easier. The reappearance of such discharge in the middle or superior meatus, after repeated cleansing of the nose, narrows the problem down to the two groups of sinuses, namely, those draining into the middle and those into the superior meatus. In this connection the position of the head and the use of suction may be helpful. With the nasopharyngoscope the origin of the discharge may occasionally be better determined. Transillumination is used by many, but, in my opinion, it will show nothing that the roentgen ray will not demonstrate much more reliably.

The roentgen ray affords considerable assistance in diagnosis. It gives first a general orientation as to the sinuses; important because of the variability even as to their presence or absence. It should be remembered that the roentgen ray is useful only because of the variable densities of the different tissues. It is only of service in sinus disease when the pathologic changes consist of fluid or mucous membrane thickening of sufficient density to obstruct the ray. There may be sinus disease of very considerable extent, and this is true particularly of ethmoidal involvement, when not enough fluid is collected at any one time nor enough mucous membrane thickening is present to obstruct the ray.

The roentgen ray is most helpful with regard to the antrum, because of the presence of a large cavity that may contain a very considerable amount of fluid, or in which the thickening of the mucous

membrane is sufficient in amount to obstruct the ray. Fluid levels, changing with the position of the head, can sometimes be determined, and polypoid and mucous membrane thickening be outlined. The amount of pus in a sinus may vary from hour to hour. Roentgenograms are shown in which pus was demonstrated in the antrum with fluid level, a large part of which pus disappeared on blowing the nose, as seen by a film taken a few minutes later. Occasionally, the pathology in the ethmoids and sphenoids is sufficient to obstruct the ray. Stereoscopic, as well as other views, are always necessary for the best interpretation. The roentgen ray, however, as elsewhere in medicine, though of extreme usefulness, may lead into error unless viewed with proper clinical perspective. Frequently, the roentgen-ray report on sinuses is negative, when the patient has furnished a tremendous quantity of mucopurulent discharge from the nose. Such a report is not misleading. From the discharge collected it is already known that there is extensive sinus infection. The negative report is really valuable in excluding gross changes. Such changes would be expected in the frontals or antrums, and their absence favors the healthfulness of those sinuses and point toward the spheno-ethmoid group as the seat of the disease. I have, in performing an external fronto-ethmoidectomy, opened frontal sinuses that showed little or nothing on the plate, to find them filled with pus or polypoid mucous membrane bathed in a thin, watery fluid.

Stereoscopic roentgen-ray pictures in several different positions, both anteroposterior and lateral, are always made. If there is antrum or frontal disease of any moment, the pictures usually show evidence of it. However, diseased antrums have been found on washing and diseased frontals on operation, when the indications of pathologic changes in the roentgen-ray pictures had to be found after the facts were known. I have then been able to correct the interpretation of the plates by evidence so slight that it was overlooked.

The localization of the affected sinus is best worked out by exclusion. If discharge is seen in or gathered from only one side of the nose, the other side may be presumed at the time to be free from infection. Discharge appearing repeatedly in the anterior part of the nose is not likely to be coming from the sphenoid, and vice versa.

Diagnostic puncture, aspiration, injection plus aspiration, and lavage are perhaps the most important and reliable means of gaining diagnostic data as to the condition of the antrums. After cocainizing the nose, a luer needle (spinal puncture size) is introduced into the antrum via the inferior meatus. A luer glass syringe is fitted to this needle and the piston is partly withdrawn. The aspirated fluid is often diagnostic and may show the characteristic yellow of antral cystic fluid, or vary from faintly cloudy fluid to thick pus. Often it may be impossible to withdraw the piston, because no room free from thickened mucosa can be found

in the antrum for the point of the needle, also the opening into the nose may be blocked by swollen tissue on the nasal side. In the latter case, fluid that will wash through into the nose showing the valvular occlusion from the swollen nasal mucosa can sometimes be injected. Air is never injected into the antrum until the needle has thus been determined to be free in the antral cavity. A death in our clinic four years ago followed quickly the injection of air at the hands of a young assistant. Necropsy showed air in the heart.[1]

When no pathologic change is demonstrated by aspiration, a small amount of sterile water is injected into the antrum and withdrawn. This may show cloudiness which is diagnostic. Chemical and bacteriologic examination of the withdrawn fluid gives promise of being of great help in the diagnosis of antrum disease, and these examinations are being brought to a degree of practical usefulness by many workers. When the foregoing have been unproductive of diagnostic help, the antrum is irrigated with sterile water through the same needle and the return is gathered and put into glasses where it can be studied before the light. Although of extreme usefulness, there is a chance for error in this procedure. The following incident will illustrate this. For a long time an occasional case in which there were positive signs of antrum disease in the roentgen-ray plate showed no evidence on puncture and irrigation. About a year ago, a patient was under my care in whom the roentgenograms showed both antrums full of fluid. I inserted the needle into the right antrum but could not succeed in aspirating any fluid, as occasionally occurs. I washed out this antrum and the fluid returned absolutely clear. I then placed a needle in the left antrum and aspirated 3 cc. of thick, viscid material of about the opacity of ground glass. I dropped this known quantity of thick discharge into a glass containing the same amount of water as was used to irrigate the other antrum, and it was completely dissolved—not a trace of the material could be seen. I operated on both antrums a few days later, and both were filled with discharge and lined with polypoid mucosa. For this reason a chemical as well as a bacteriologic examination should be made of the wash water. The right antrum was undoubtedly full, as was the left, of the same material which dissolved completely.

If clinical experience, roentgen ray and irrigation proves that the antrum is healthy or, if diseased, after its complete cure, there is still discharge seen in or gathered from one side of the nose, the upper sinuses on that side are necessarily furnishing it. The antrum has been excluded as far as is possible by present methods. The discharge may be said to be coming from the frontal, ethmoid or sphenoid sinuses. To

1. Bacher, J. A.: Fatal Air Embolism After Puncture of Maxillary Antrum-Autopsy, California State J. Med. **21**:443 (Oct.) 1923.

differentiate between these localities is often very difficult and in my hands, sometimes impossible.

The clinical data already mentioned are useful, but are insufficient grounds for diagnosis. Pain over the brow may not be due to frontal sinus disease at all, but to the ethmosphenoid group, or even antrum. The location of the pus in the nose, while significant, may be misleading, coming from an anterior ethmoid cell. Irrigation of the frontal sinus in a certain small percentage of cases gives information comparable to that obtained by washing out the antrum. In many cases it is impossible satisfactorily to enter and irrigate the frontal sinus. When irrigation is possible, negative findings are as valueless as in the case of the antrum. So, on the whole, irrigation of the frontal sinuses is a method of diagnosis that is unsatisfactory. I would qualify this by excepting those cases with frank pus and catheterizable ostia. Therefore, in most cases one may rely for diagnosis of frontal sinus disease on the clinical evidence, irrigation and the roentgen-ray plates. Pictures of the frontal sinuses are, as a rule, though not always, capable of showing disease when present.

Having excluded antrum and frontal sinus disease from the picture, any discharge seen in, or gathered from that side of the nose, must be coming from the ethmosphenoid group of sinuses. When the discharge is distinctly yellow and thick enough to be traced to its source, it may be possible to distinguish between the anterior and posterior group of ethmoid cells by the location of the discharge in the middle or superior meatus. The sphenoid may be washed out and satisfactory evidence, which must again be positive, be found. However, this ethmosphenoid group of sinuses is often the seat of a mucopurulent discharge that is blown from the nose or drops into the throat in large quantities, although little or none of it is seen, even on repeated examination of the nose. When seen, it may be of such a consistency that it is not possible to trace it to its source. These cases present great diagnostic difficulty. The roentgen ray, so useful in antrum and in frontal sinus infection, is often very disappointing for the reasons already enumerated. When there is sufficient discharge collected or sufficient mucous membrane thickening, the roentgen ray will show it.

Patients, then, who present the proper clinical evidence and furnish definite purulent or mucopurulent sinus discharge from one side of the nose, and whose corresponding antrum and frontal sinus are proved to be free from infection, necessarily are affected with disease of the ethmosphenoid group of sinuses. Again I repeat that it may not be possible to exclude the frontal sinus except by direct operative inspection. I also believe that it is generally impossible to distinguish between disease of the anterior and posterior groups of ethmoid cells, also in many cases to diagnose sphenoid infection from the rest of the group.

So I believe that this group of sinuses, with the exception of those few cases in which a finer differential diagnosis can be made, must be considered as a whole. A diagnosis of ethmosphenoid disease made by exclusion must necessarily be the result of careful study. The patient is taught to gather discharge from the nose on cloth. This is brought or sent to the office for inspection, sometimes over long periods. In some patients, the condition is studied for years, to be certain, first, that they already have chronic sinusitis and, second, to determine the particular sinus that is affected.

DIFFERENTIAL DIAGNOSIS

Aside from the discharge from the nose coming because of a foreign body or of some unusual type of mucosal infection, the two conditions that would appear to cause diagnostic difficulty are atrophic rhinitis and allergic irritation. It would lead too far afield to consider all the difficulties presented in distinguishing between atrophic rhinitis and sinus infection. Who will say that many cases of that disease are not caused by sinus disease? Certainly some patients, apparently with that type of disease, are much improved by cleaning out a sinus that is shown to contain pus. Too little is known about atrophic rhinitis for an intelligent discussion of the subject.

Allergic irritation or hay-fever causes a nasal condition that is a real obstacle to the diagnosis of sinus disease. There are not many conditions that produce a watery discharge from the nose of more or less chronic character. Sinus infection and hay-fever both do. When the discharge becomes at times purulent or mucopurulent, the condition is a sinus infection even though it may be grafted on, or caused indirectly by, the allergic condition. But when there is only the thin, watery discharge it is sometimes very difficult to exclude sinus infection, especially of the ethmosphenoid group. All the modern methods of dealing with allergic conditions must be exploited. They are frequently disappointing. The important thing is for the patient to watch the discharge for pus or for mucopus. Such study may require his observation over long periods.

TREATMENT

I shall not consider the nonoperative treatment of sinus disease except to say that the one most important factor in its cure is a change from a cold climate to a warm, mild, dry atmosphere. Cold, fresh air in abundance may be excellent for pneumonia and some forms of tuberculosis, but the type of case must be carefully picked, as the use of cold air has been abused. It is often irritating and harmful in patients with an inflammatory condition of the upper air passages. It irritates and causes the mucous membrane to discharge; this causes running from

the nose and often a violent cough. Both of these factors tend to establish a vicious circle and increase the symptoms.

The statement is commonly made that climate is not important in the care of tuberculosis. One may properly take exception to that generalization. A certain percentage of tuberculous cases have had, as the basis of their trouble, a lowered vitality and bronchitis due to sinus disease. To these, the importance of a warm, dry atmosphere is unquestionable. In tuberculous patients with bacilli, cough, temperature and hemoptysis, all have seen the condition clear up in a few months because the sinuses responded to the warm atmospheric change.

Indications for Operation.—The operative treatment of sinus disease is a subject that I feel should be approached with considerable caution. I am proposing a rather radical line of procedure that I feel may add to our efficiency in handling certain cases. Still I do not wish to leave the impression that I am applying these measures except after careful study or when former unsuccessful operative work would seem to make their applicability advisable. I have gone into the question of diagnosis frankly, but must make the point plain that the diagnosis arrived at does not condemn the patient to operative measures. It becomes a matter of the nicest judgment on the part of a well trained surgeon, probably with the invaluable assistance of the internist, to determine whether the sinuses should be operated on. To make a rubric of the operative indications would be about as useful as those that have been compiled to tell us when to operate on a chronic running ear. Many people with apparently excellent health are sufferers from infected sinuses. The hawking and spitting that is so commonly heard, and the mucopurulent expectoration seen on our city pavements, are evidence of the widespread distribution of sinus disease. While admitting that many people seemingly well are carriers of this infection, it is obvious that they are apparently in good health in spite of the sinusitis. It is a menace constantly carried about, and often proves to be the vulnerable heel of Achilles, leading to the establishment of some important vital disorder. The inability to discover the true focus, the removal of the wrong focus or the incomplete treatment of the right focus have brought a certain amount of opprobrium on the theory. Incomplete treatment of the right focus is practiced so commonly in connection with sinus disease, that the specialists must take the onus of the lack of understanding the importance of sinus infection on the part of many of the medical profession. These men have conscientiously and repeatedly referred patients for elimination of nasal infection. Failure after nasal sinus operation to cure the disorder in which the internist was interested, very frequently has been interpreted as indicating improper diagnosis. The use of the method I have advocated of gathering the nasal and post-

nasal discharge from the patient on pieces of cloth will show the internist himself whether the results he has asked for have been achieved.

Ordinarily, before operation on the sinuses is to be considered, all other factors that may be contributing to the trouble should be corrected; climate has been given especial prominence. Whatever therapeutic measures have been found useful may be employed.

Constructive surgery, when indicated, including submucous resection, tonsillectomy and adenoidectomy, should be given precedence and followed by sufficient time for accomplishment of results before the destructive surgery of the sinuses is advocated. As the operative technic that is subsequently described has to deal only with the upper group of sinuses, the antrums will be omitted in considering the operative indications. The operation is applicable to several different combinations of upper sinus disease.

FRONTAL SINUSITIS UNCOMPLICATED BY ETHMOSPHENOIDITIS

Acute Frontal Sinusitis.—This condition can usually be remedied by local and general nonsurgical measures, or amputation of the anterior end of the middle turbinate, breaking down a cell or two about the ostium to permit widening the canal. When such treatment or conservative surgery fails to bring relief, or when the local and general symptoms are so virulent that such measures would appear to be futile as well as dangerous, some type of radical frontal sinus operation should be employed. Intranasal operations including damaging entrance of instruments into the frontal sinus should not be performed on a frontal sinus with virulent acute inflammatory symptoms. The technic to be described later may be used, local anesthetic when conditions permit—otherwise general narcosis.

The opening and drainage of the frontal sinus is essentially the same as in the orbital part of Killian's operation, except that the incision does not go up into the brow. This operation can be expected to achieve all the results that can be gained by operating in the classical Killian manner, when the frontal sinus does not extend much superiorly to the brow.

Chronic Frontal Sinusitis.—Acute exacerbation of the chronic process would class this condition with the foregoing. The symptoms of this condition have been already outlined, and their severity must determine the necessity for operation. Intranasal methods to give more drainage space should be employed, and any local therapy, in the way of irrigations found useful by the surgeon, may be tried. These measures are frequently disappointing and, when the symptoms demand, external operation is indicated. The frontal-ethmoid technic, under local anesthesia, is advocated with adaptation only to the frontal disease.

Acute Ethmosphenoiditis.—This condition frequently accompanies acute frontal sinusitis. Conservative intranasal measures should be employed for its relief. When these fail and the symptoms demand, the frontal-ethmoid technic should be employed under local anesthetic when possible, otherwise under general narcosis.

Chronic Sphenoiditis.—When isolated sphenoid infection is diagnosed, or when, after former operation, the sphenoid is found to be inadequately opened, it may give rise to symptoms requiring operative intervention on it alone (I have only had experience with the latter condition). The sphenoid technic (to be described later) can, in such cases, be employed under local anesthetic, working entirely intranasally.

Chronic Ethmosphenoiditis.—Difficulties not only in diagnosis but in treatment as well are presented in chronic ethmosphenoiditis. Every effort to give relief should be made before any operative treatment whatever is advocated. Also, as said before, the symptoms enumerated must be sufficiently distressing to demand relief from the condition. Some serious general condition may have caused the reference of the patient from the internist. It is impossible to enumerate all of the possibilities, but the mere presence of the infection is not enough to warrant operation. Intranasal surgery has usually been performed when operation is indicated. This varied from partial to complete ethmosphenoidectomy. In some patients excellent results were attained from intranasal work. Many, however, were not freed from their symptoms and often were subjected to repeated intranasal surgery. The inability to cure is frequently caused by the orbital extension of the ethmoid cells incapable of exenteration by the intranasal route, and also to incomplete drainage of the sphenoid sinus.

Chronic ethmosphenoiditis is frequently associated with chronic disease in the frontal sinus. Even when it is concluded that the frontal sinus is normal, one's diagnostic acumen may prove false. It is, therefore, of considerable importance when subjecting a patient to an operation as serious as an ethmosphenoidectomy to have a technic that will not only reach the orbital extensions of the ethmoid cells, but will take cognizance at the same time of probable or possible disease in the frontal sinus. The external frontal ethmosphenoidectomy operation under local anesthesia is recommended in three types of cases of chronic ethmosphenoiditis, in which the symptoms, because of their local or general disturbance, demand operative treatment: (1) Those patients who have been unsuccessfully operated on by the intranasal method; (2) patients in whom there is known or suspected frontal sinus disease; (3) patients in whom roentgen-ray study has shown orbital extension of the ethmoid cells and in whom, in the judgment of the operator, the more radical procedure indicated by the exigencies of the particular case promises speedier relief and more satisfactory results.

Intranasal Versus Extranasal Ethmosphenoidectomy.—The intranasal route has been the method of choice in most accessory sinus surgery. Excellent results are usually obtained by this manner of operating on the maxillary sinus. Intranasal operations on the frontal sinus have proved generally inadequate. Intranasal operations on the ethmosphenoid labyrinth are satisfactory in a proportion of cases. There are many skulls, however, in which both the ethmoid and sphenoid sinuses extend laterally beyond the plane of the lamina papyraceae. These cells can be demonstrated by the roentgen ray. While these patients can be benefited by improving the drainage from the lateral extensions, it is quite impossible to exenterate these cells satisfactorily, working only through the nose. Then there is the importance (already emphasized) of being able to diagnose and to handle frontal sinus conditions efficiently.

The extranasal route has been widely condemned in our society meetings, both by essayists and in the discussion, largely because of the interference by bleeding, making proper work in a dangerous field impossible. Extranasal surgery usually implied general anesthesia. Local anesthesia changes the picture entirely. I have found that, operating under this form of anesthetic and using certain operative technic hereafter described, bleeding ceases to be a troublesome factor. Radical operations on the maxillary sinuses are frequently performed under local anesthesia, and there are references in the literature to the use of local anesthesia in work on the upper sinuses. However, I have not been able to find any detailed description of such work.

Extranasal operations have often entailed disfigurement of the patient. The scar is negligible in my cases and the contour lines of the face are not disturbed.

OPERATION

The patient is allowed a light breakfast, that is, coffee and toast. One and one-half hours previous to the operation he is given $\frac{1}{150}$ grain (0.4 mg.) of scopolamine hypodermically, $\frac{1}{4}$ grain (16 mg.) morphine sulphate (dose graduated when weight of patient demands). This is a small dose of scopolamine as compared to that used by the obstetrician. It relaxes the patient without interfering in any degree with his cooperation, when that is required. I have never, in a great number of such injections, had any of the untoward signs of excitement occasionally referred to in the literature.

The patient is placed on his back on the operating table. The head is slightly elevated, and the face about the field of operation is painted with iodine and washed with alcohol. The brows are not shaved. Folded gauze of eight to ten thicknesses is then fastened to his upper lip by sterile adhesive plaster. This gauze falls down over his mouth,

but does not interfere with his breathing. Towels are then draped as shown in figure 18. Aseptic technic is earnestly attempted. No endeavor is made to disinfect the interior of the nose. The skin is apparently immune to whatever bacteria are necessarily contained in the nose, as shown by the fact that I have always obtained primary union of the incision.

The nose is cocainized thoroughly in the upper part, and in the region of the sphenoid and upper nasopharyngeal wall. Attention is given to the exit points of the sensory nerves, especially the sphenopalatine foramen. The cocaine is picked up in powdered form on a fine, cotton tipped applicator, dipped in epinephrine 1:1,000. A strip of gauze moistened with cocaine is laid well back against the sphenoid and in the ethmoid region. The skin over the line to be incised is anesthetized with a 1 per cent procaine epinephrine solution. A fine, 2 inch, skin needle on a 5 cc. luer syringe is used. The needle is inserted into the deeper layers of the skin at the lower end of the contemplated incision line. The superficial tissues are slowly infiltrated by pushing the needle gradually upward. The amount of fluid being injected and the position of the point of the needle can be guided by the index finger of the left hand. The needle is passed upward following the skin, until it impinges on the under surface of the roof of the orbit at the inner angle of the brow. At this point the supratrochlear and supraorbital branches are infiltrated. The needle is now partially withdrawn, and through the same puncture hole the deeper layers of the tissue, including the periosteum covering the frontal process of the superior maxillary bone, are infiltrated. In all this technic, care is taken not to inject so much fluid as to cause edema and obscure the landmarks. The location of the ethmofrontal suture line is now estimated and a no. 21 gage, 2½ inch needle fitted to the luer syringe is introduced, superior to this line, directly backward along the upper and inner wall of the orbit. The needle is kept always above the ethmofrontal suture in order to avoid injury to the ethmoid arteries. The heavier needle prevents its bending and can be better directed along the bony walls. The point is frequently pricked against the bone to be sure of apposition and the fluid is injected well back toward the depth of the orbital wall. In this way the supraorbital, supratrochlear and ethmoid nerve branches are anesthetized. Fluid injected into the orbit, outside the periosteum, will naturally cause proptosis. This should be avoided by keeping close to the bone and using a small amount of fluid. This rather startling occurrence took place to a slight extent in one of my patients. The fluid, however, was quickly absorbed and caused no harm whatever. The needle is withdrawn and inserted again so as to hug the orbital wall above the lacrimal sac and inferior to the estimated fronto-ethmoid suture line. The needle is again inserted into the orbit at the inner lower angle. The

floor of the orbit is "picked up" by the point and the needle worked carefully posteriorly and medianward. Care is taken not to puncture the lacrimal sac. The needle enters the orbit external to the sac and reaches the orbital wall posterior to it. Altogether, about 10 to 15 cc. of a 1 per cent solution of procaine is used, to which a few drops of epinephrine have been added. Anesthesia is now complete, and the incision may be immediately made.

The incision, as shown in figure 1, is about 3 cm. in length, made through the skin with a sharp knife, and then quickly carried down through the periosteum. The sooner the periosteum can be raised and

Fig. 1.—Insertion of needle along inner orbital wall.

the soft parts elevated, the easier is the hemorrhage controlled. The bleeding points are picked up and ligated with fine catgut. All bleeding is stopped.

The periosteum is more easily raised in the upper inner angle of the field and the elevator is passed into the orbit slightly and brought down till the resistance of the strongly attached fibers of the middle palpebral ligament are encountered. These are best raised from the bone by a sharp edged chisel used as a periosteal elevator. Care must be exercised not to injure the lacrimal sac, which is now raised from its bed in the lacrimal fossa. No harm is done to the tear ducts or sac, and lacrimation is not complained of after recovery from the operation. The fibers of the palpebral ligament attached to the posterior edge of this fossa must also be elevated with care, to avoid tearing through the

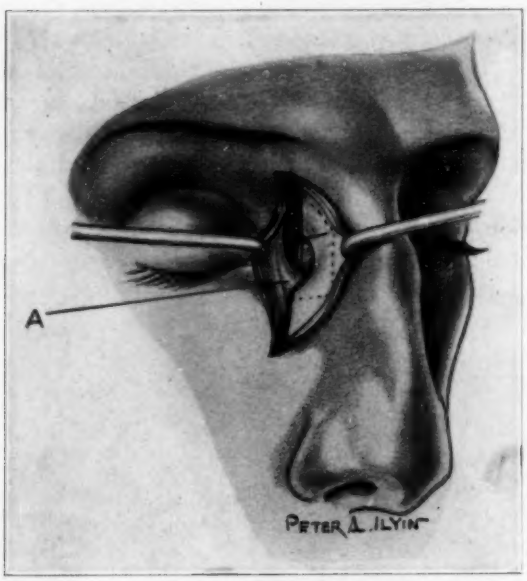

Fig. 2.—Outline of window to be cut through the bone. *a*, tear sac.

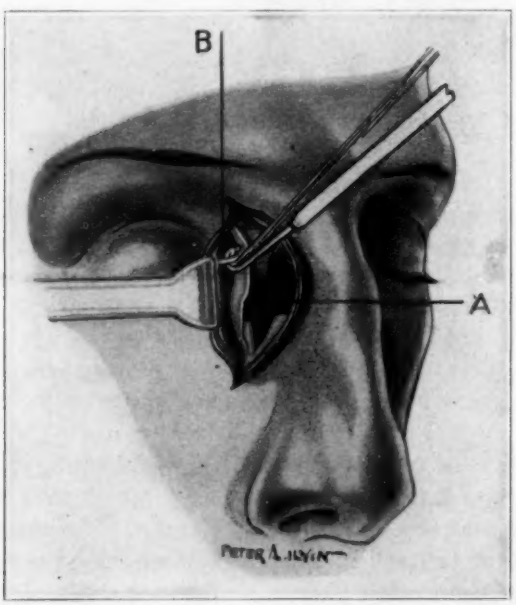

Fig. 3.—Nasal mucosa (*a*) intact; anterior ethmoid artery (*b*) exposed; ligature passed about the artery with curved ligature carrier.

periosteum. It is rarely necessary to interfere with the attachment of the superior oblique muscle. It is usually possible to work posteriorly to its attachment. The edges of the wound are retracted, exposing the bone covering the ethmoid and lower frontal region.

The window of bone to be removed is estimated, and with a sharp 8 mm. flat chisel, the lower limit of the bony window, usually a few millimeters below the upper end of the lacrimal fossa, is outlined. The chisel is worked through gradually until the nasal mucosa is reached. Care is taken not to cut through this nasal mucous membrane. The cut through the bone is made below first, while the upper parts are still intact. This lends firmness and assists the cutting. With a gouge the

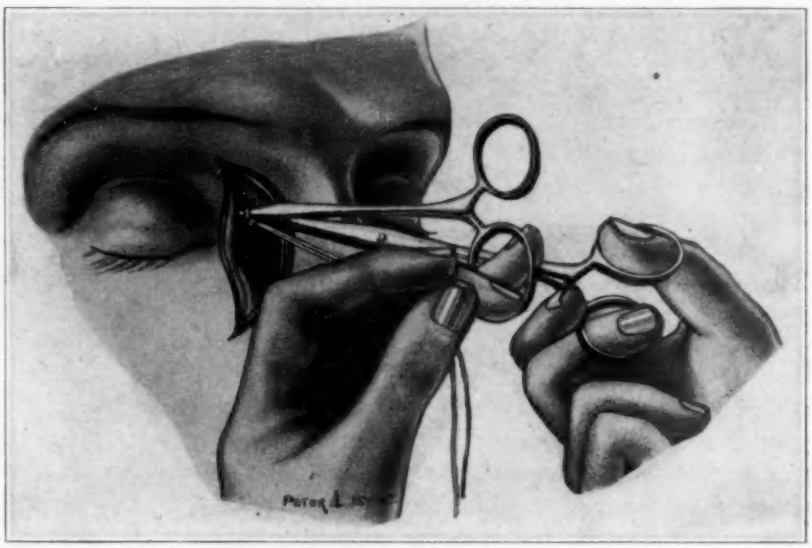

Fig. 4.—Another method of handling the anterior ethmoid artery; ligation by forceps method.

thin bone at the inner upper angle of the orbit covering the frontal sinus is removed, and the frontal sinus is entered. If it is normal, it is not disturbed, though a probe is passed downward into the nose to outline the anterior edge of the bony window to be removed. The anterior edge of the bony incision is now outlined with the flat chisel. This joins the lower bony cut with the opening in the frontal sinus. After the bone has been cut through, the chisel is used as a lever and the bony window is pried gently upward. It is grasped in a small, rongeur forceps and is removed in one piece or when this fails, piece-meal. The external posterior edge of the bony window, which includes the attachment of the frontal process of the superior maxillary bone with the lamina papyracea and the lacrimal bone, is ignored, as it breaks easily. The

bony opening now exposes from above downward the frontal sinus, anterior ethmoid cells and below the nasal mucosa.

Ligation of Ethmoid Arteries.—The orbital periosteum is raised and the anterior ethmoidal artery and nerve are exposed. A silk or catgut ligature is passed about them with a blunt, curved carrier, and they are tied and cut. The posterior ethmoid artery may be treated in the same way later in the operation. Care is exercised in surrounding these arteries, as they are often accompanied by a flat web of periosteum which is quite adherent at the ethmofrontal suture line.

The nasal mucosa at the lower angle of the bony opening is cut through above and anteriorly, and pushed downward into the nose to be used later.

The ethmoid cells are now studied. The field is bloodless and they can be curetted carefully and thoroughly. The lamnia papyracea is removed to any extent that may be necessary to gain access to the various extensions. The more that is retained, the less will the orbital structures bulge into the nose. If the middle turbinate has not been excised, it may be cut off a few millimeters from the cribriform plate and removed.

The lower wall of the frontal sinus may now be resected, if that sinus is diseased. The lateral extension of the ethmoid cells can also be taken care of in the same manner.

When the sphenoid sinus is reached, it is entered with a probe and the available anterior wall removed with a chisel. Care is taken at this stage of the operation not to work low enough to injure the sphenopalatine artery. This artery runs across the body of the sphenoid to the septum. If, as is commonly found, the sphenoid sinus is large, its floor sloping downward and backward, simply opening its thin anterior wall is insufficient for proper drainage.

My experience, in studying my own and other physicians' patients in whom the sphenoid was operated on, is that the opening in many cases is inadequate. Drainage is not downward as it should be, and as a consequence postoperative granulation tissue crowds the opening. Of course this is not always true but depends on the depth of the sphenoid sinus, the height of the anterior wall, and especially the width between the external and septal boundaries. Some authors advise against work in the sphenoid because of resultant exuberant granulations. Granulation tissue does not flourish when drainage is properly maintained.

In order that there may be adequate drainage from the sphenoid sinus, the floor should be removed when that is possible. Of course, where there is an extension into the pterygoid process, dependent drainage cannot be obtained except by methods that are not ordinarily warranted.

Fig. 5.—Dissecting mucoperiosteum from body of sphenoid.

Fig. 6.—Same as figure 5, enlarged.

Ligature of the Sphenopalatine Artery.—Extensive work on the sphenoid sinus wall is sure to result in injury to the sphenopalatine artery. This may cause profuse and disturbing hemorrhage. Yankauer first brought to my mind the possibility of dealing adequately with that artery. He describes the dissection downward of the mucous membrane from the body of the sphenoid. In this layer of mucous membrane the artery is contained. He grasps this mucous membrane flap with a strong pair of forceps and so compresses the vessel. This procedure alone I found inadequate to control the hemorrhage, and I added the metal clip to his idea. This blocks off the vessel satisfactorily, but the presence in the throat of such metal clips is fraught with some danger of their aspiration. I have used them without untoward result, I must admit.

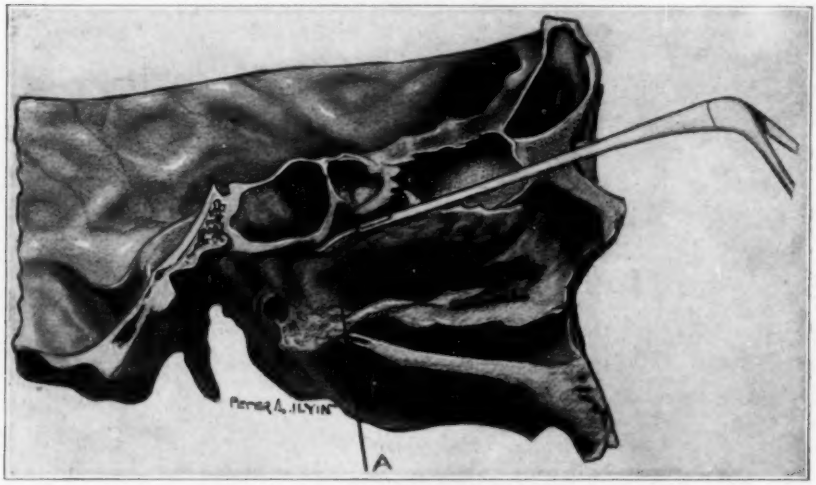

Fig. 7.—Yankauer's method of compressing the sphenopalatine artery. (*a*) mucous membrane from sphenoid containing sphenopalatine artery.

Of course the ideal solution of such a problem is ligation of the vessel, and my first assistant, Dr. Roy Nelson, accomplished this very skilfully; I have since used his method regularly. Curved needles with permanent handles are used. A number of different curves should be available. Armed with heavy black silk or catgut, the needle is passed up through the nose and as much of the mucous membrane taken as wished. It may be necessary to take away some of the floor of the sphenoid sinus at this time to allow the needle to be passed upward into the sinus. A thin handled, small hook is passed through the external wound, and the thread is caught up from the point of the needle and brought out. The needle is withdrawn, leaving one thread through the nose. This thread is passed into the nose and grasped and brought out with the other end through the external wound. The needle can some-

Fig. 8.—Sharp ligature carrier has been pressed upward through mucoperiosteum, encircling the sphenopalatine artery. Act of hooking up the ligature shown.

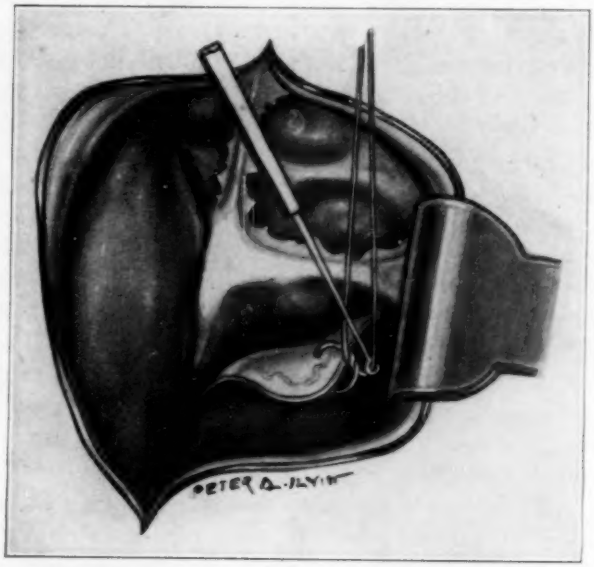

Fig. 9.—Tying sphenopalatine artery in the depth with ring tyer.

times be more conveniently passed from above downward. The threads are knotted singly and tied in the depth by means of a ring tyer; a second knot follows. This process may be repeated to take as many bites in the mucous membrane as wished to insure inclusion of the sphenopalatine artery.

SPHENOID DRAINAGE

Posterior Submucous Resection.—When the sphenoid is deep, the removal of the floor presents a special problem. When the space between the septum and the lateral wall is narrow, it is impossible to obtain adequate downward drainage with ordinary methods. I believe that such drainage is so essential in some cases that I have devised the following technic for gaining the desired end.

When both sides of the nose have been operated on at the same time, and both sphenopalatine arteries have been tied, a more or less vertical incision is made through the mucous membrane covering the posterior part of the septum. The mucous membrane is elevated as in doing a submucous resection; from this incision back to the base of the sphenoid a semicircular area of the mucous membrane is removed. The thin bony septum is then perforated with an elevator, and the corresponding mucous membrane on the other side is elevated. With biting forceps the back part of the septum is removed. The mucous membrane elevated on the second side is cut away. The base of the sphenoid is now exposed to view on both sides. The septum dividing the two sinuses is removed and the two sinuses are thrown into one cavity. The floor of this united cavity can now be removed. This gives space for drainage that granulation tissue from the sides will not ordinarily close. There is no bleeding of any moment from any of these structures after the two sphenopalatine arteries have been tied.

When operating on one side only, a posterior submucous resection may be done as follows: The mucous membrane in such a case is not cut away, but is reapplied to its fellow of the opposite side. The submucous resection of the base of the vomer with its wide rostrum usually gives room for adequate drainage of the one sphenoid by the removal of its floor. The other sphenoid can be opened at this time and studied and drained if advisable.

While the major parts of the operation have been described, there are certain details that are of the greatest importance that must now be considered.

When the frontal sinus is diseased, it is cleaned out as thoroughly as possible with curettes. In order to obtain a cure, however, intranasal drainage from that sinus must be maintained over a long period. The objection to an operation of this type for the cure of frontal sinus infection is that the opening into the nose closes up. That was one of the objections to Killian's epoch-making technic. The removal of

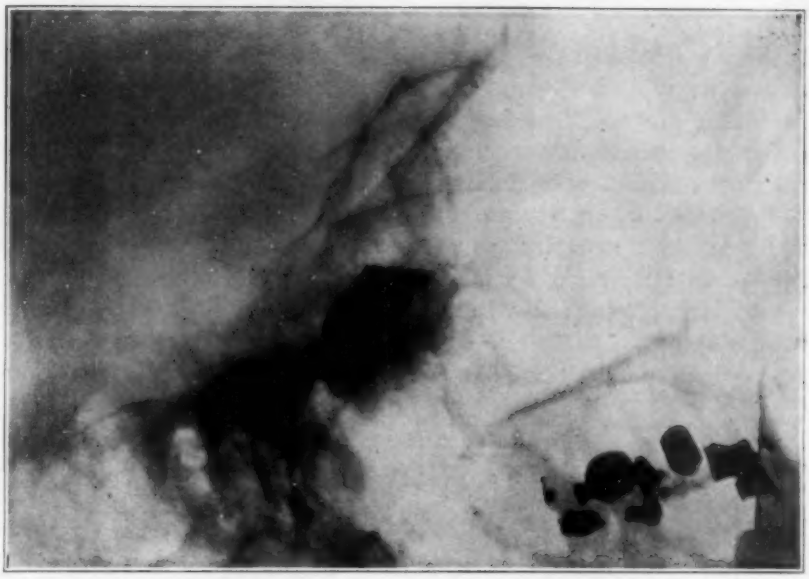

Fig. 10.—Roentgenogram of patient, in whom the ethmoids and sphenoids were operated on before he consulted me, for profuse discharge in the mornings. Good postoperative opening in upper anterior wall of sphenoid. Lipiodol demonstrates large pockets in both sphenoids.

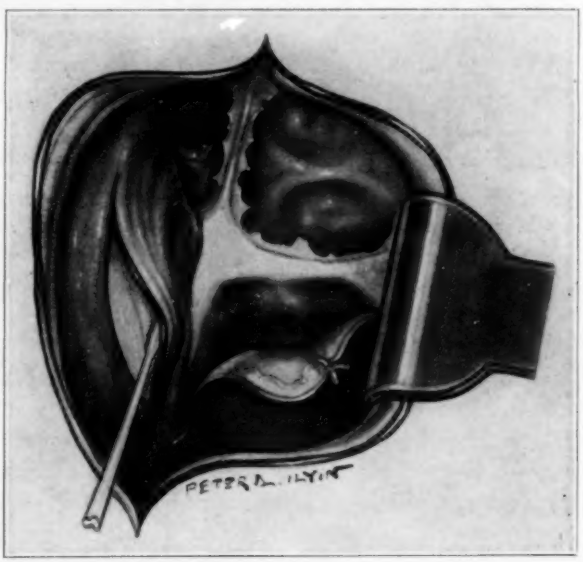

Fig. 11.—Posterior submucous resection for gaining better access to sphenoids. Sphenopalatine artery represented as ligated.

the frontal process of the superior maxillary bone and the ethmoid mass and lamina allows the soft parts of the orbit to be drawn inward in the healing process. Unless guarded against, this may defeat the purpose of the operation in a certain number of cases, as far as drainage from the frontal sinus is concerned.

In one of my early cases, the patient, after several weeks, had swelling and inflammatory symptoms in the frontal region, and a fistula developed. I reopened the incision under local anesthesia, and found that the frontal sinus was full of pus and the passage into the nose entirely occluded, as described in the foregoing. To obviate this, a piece of rubber tubing is placed in the frontal sinus and brought out

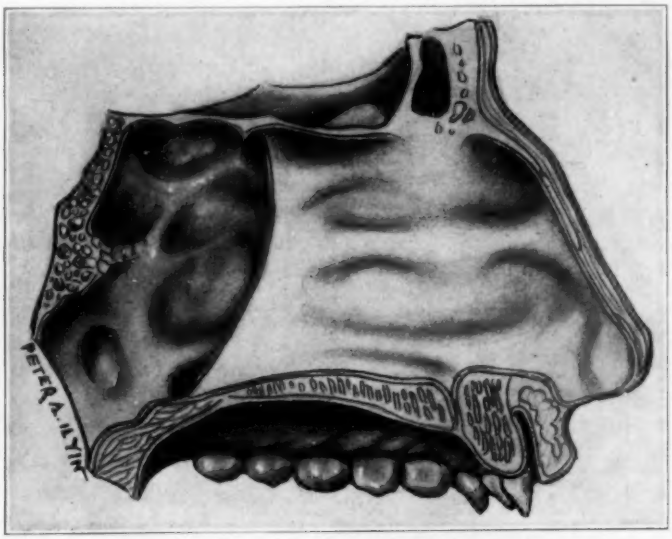

Fig. 12.—Both sphenopalatine arteries have been tied and back part of the septum has been removed.

of the nose. A small safety pin is passed through the dependent end and fastened with some adhesive tape to the end of the nose. As large a tube is used as possible without causing too much pressure.

This tube is worn for about one week or ten days and, after that, sounds are passed into the frontal sinus. These sounds, up to 6 or 7 mm. in diameter, the size depending on the available space, are passed daily and then the largest one practicable is given to the patient, who quickly learns to introduce it and continues its use. That will keep the opening patulous; once epithelialized the drainage is assured.

High Submucous Resection.—Before introducing the drainage tube, the operative field should be carefully studied through the nose with nasal speculum. If there is a superior septal deflection that interferes

with the full attainable space in the upper part of the nose, this can be quickly removed by a high submucous resection. This is done in the usual manner, but the incision is placed as high as necessary simply to remove the obstruction. When there has been a badly deformed septum it would probably have been attended to prior to the operation.

Also, with the attainment of space in the nose in view, the uncinate process may be chiseled off, working through the nose. Thickness of the frontal processes of the superior maxillary bone can be removed intranasally in this manner. It is surprising how much room can thus be gained for the reception of the drainage tube.

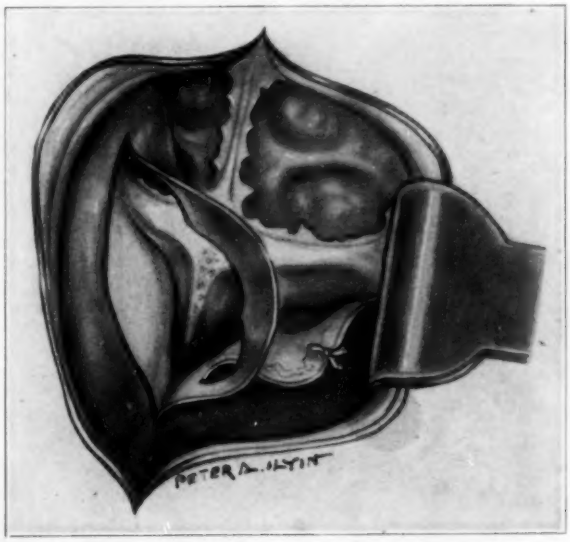

Fig. 13.—Submucous resection of back of septum; mucous membrane retained and replaced; only one sphenopalatine tied.

No more mucous membrane is removed from any of the sinuses or cells than is necessary to secure adequate drainage. Before closing the incision, the flap of nasal mucosa, which was pushed downward into the nose out of the way, is brought out and fastened with a fine catgut suture to the soft parts. This aids in preventing granulation tissue filling the anterior part of the nose.

The incision is completely closed with 3 to 5 horsehair or fine silk sutures. No marks on the skin are necessary for its proper coaptation. The incision line is sealed with a little compound tincture of benzoin without gauze. No packing is placed in the nose after the operation. The sutures are removed on the third day.

TECHNIC FOR FREEING THE OPTIC NERVE BY REMOVAL OF THE OPTIC CANAL

Optic neuritis with ultimate blindness may be the result of constriction of the optic nerve in the optic foramen due to adjacent sinus disease; optic tumors, or the consequence of disturbances, due to "tower skull." The exact mechanics involved in the latter condition have been the subject of controversy. However, the possibility of relieving these patients by widening the optic canal has long been recognized. Three different approaches have been used in the comparatively few patients who have been operated on. While the results have been encouraging, they have been influenced by the late stage of optic atrophy at which

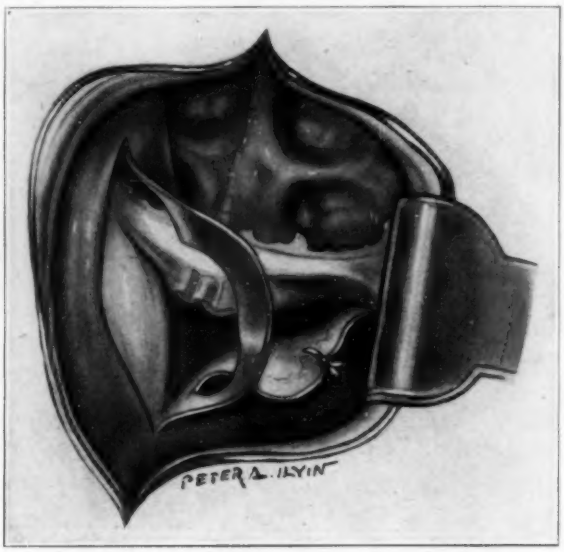

Fig. 14.—Nasal septum has been removed; septum between sphenoids has been removed, throwing both into one cavity.

they were performed. The difficulties of the operative procedures in vogue may be partly responsible for the hesitancy in operating. Van der Hoeve [2] says the canal operation for preservation of visual power should be performed only if both optic nerves are endangered in such a measure that absolute blindness is to be feared.

Three routes of approach have been used: Schloffer [3] used a flap of the skin, periosteum and bone of the orbit. He raised the frontal lobe of the brain and approached the optic canal from in front. Hildebrand [4] entered the orbit under the brow, chiseling off a bit of the

2. Van der Hoeve, J.: Am. J. Ophth. **8**:101 (Feb.) 1925.
3. Schloffer: Klin. Med. **41**:1 (Aug.) 1913.
4. Hildebrand, Otto: Arch. f. Klin. Chir. **124**:199 (April) 1923.

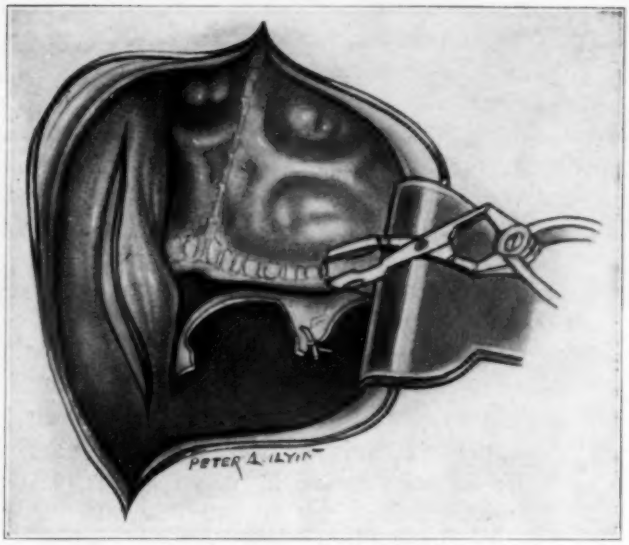

Fig. 15.—Removal of floor of combined sphenoid cavities.

Fig. 16.—Suturing nasal mucosa to lateral wall.

orbital edge. He retracted the eye downward, pierced the orbital roof near the optic canal and with thin forceps enlarged the optic foramen. Dandy [5] entered by the temporal route and approached the foramen by raising the frontal lobe of the brain. It may be conceded that the intracranial approach is necessary when intracranial growths are in question.

Optic neuritis due to sinus disease has been relieved in many cases by operation on the ethmosphenoid sinuses. Cases occur, however, probably of this type, in which the ordinary ethmosphenoid exenteration, usually performed intranasally, is of no avail. It is reasonable to presume that certain of these failures to cure may be due to the fact that the nerve has become so constricted in the optic canal that sinus exenteration alone is not sufficient.

In operating, as described, on ethmosphenoid sinuses, I have frequently approached so closely to the optic foramen that the inclusion of the removal of the wall seemed to present no great difficulty. I have, therefore, taken up the problem in the dissecting room and have formed this plan of optic foramen approach, which apparently is entirely feasible. The periosteum, including the attachment of the muscles is raised from the depth of the orbit. The posterior ethmoid artery is tied, if not already ligated. The optic foramen is brought into view. There is more room for approach than in the orbital method of Hildebrand because of the width of the sinuses which have been exenterated. With biting forceps the wall between the optic foramen and the sphenoid, often paper thin, is easily removed and the other walls can likewise be reached and removed.

This operation I have never performed on a living subject, but believe it would be easier and take less time than the sphenoid technic described. It ought to be without danger either to life or to the optic nerve. It has been found that the muscular mechanism reattaches itself, and eye movements soon adjust themselves. If found practicable, I believe this approach should be employed as a routine when optic neuritis gives indication for operation on the ethmosphenoid sinuses.

REMARKS

The frontal ethmosphenoidectomy operation under local anesthesia has been performed by me twenty-five times on twenty-one patients, and by my first assistant, Dr. Roy Nelson, five times on five patients. This makes a total of thirty operations without fatalities, or any untoward accident. Two patients have been operated on both sides at the same time. Six patients have been women. The scar is almost negligible. In most patients it is seen with difficulty, and in none does it disfigure at all.

5. Dandy, W. E.: Am. J. Ophth. **5**:169 (March) 1922.

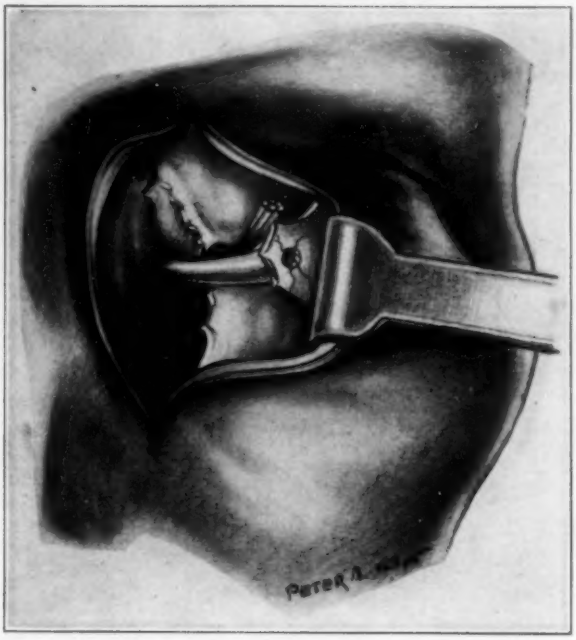

Fig. 17.—Preparation made in dissecting room. After opening the optic canal by the technic here described, the wound was opened and tissue removed to allow the artist to draw the course of the nerve. Some of the background of the eye remains.

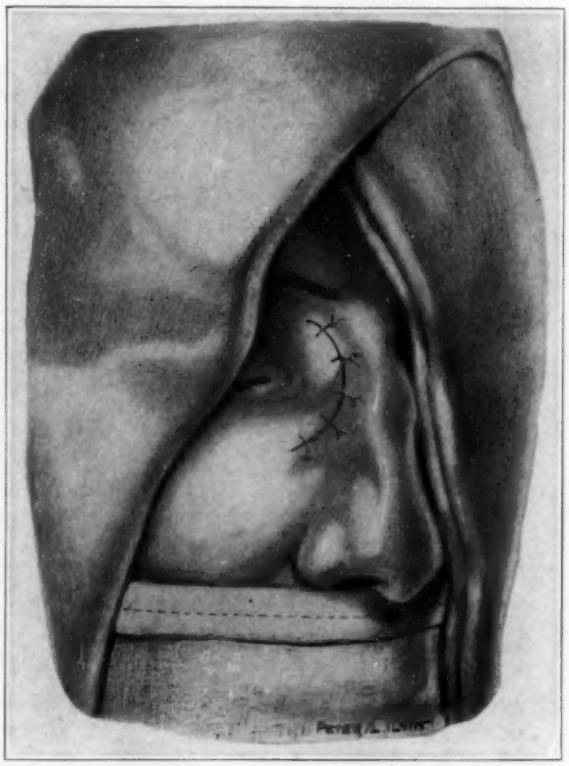

Fig. 18.—Primary closing of wound; sterile adhesive tape holding gauze over mouth to prevent contamination of operative field.

There have been no untoward symptoms from the use of 1/150 grain of scopolamine, 1/4 grain of morphine, in addition to the necessary local application of cocaine. Pain has been negligible, most of the patients hardly seeming to realize what was going on. Some who were a little nervous at the outset quieted down when they found they were not being hurt.

The time consumed is roughly one and one-half hours. This is being cut, however, as experience makes for more certainty. It is painstaking work, however, and cannot properly be hurried nor is there any necessity for undue haste.

There has been considerable bleeding in some patients on making the incision through the skin, which was quickly controlled. Some patients gave very little annoyance. Bleeding from the work in the sinuses is practically absent. The cells are searched out with a blunt searcher and the work proceeds as bloodlessly as in the dissecting room. In two cases the sphenopalatine artery was injured before tying, giving rise to brisk hemorrhage. The vessel was tied, however, in the usual way and the bleeding controlled. There has been no necessity for packing the nose at the time of, or following, the operation.

In one case the injected fluid entered the orbit in sufficient quantity to produce immediate proptosis. This subsided before the operation was completed and did no harm. This accident can probably be avoided by keeping close to the bone with the needle.

In all the cases the frontal sinus was opened and in many it was found to be diseased. In attacking the ethmosphenoid group of sinuses, it is a source of satisfaction to be in a position to diagnose disease in the frontal sinus and care for it simultaneously when necessary. Two of the frontal sinuses found diseased were previously judged to be healthy from the roentgen-ray plates. In most cases in which chronic antrum infection was diagnosed, the antrum was operated on first, and sufficient time was allowed to elapse for beneficial results on the upper sinuses before they were operated on. Some of the patients had had the ethmosphenoid group operated on previously intranasally. The ethmoid cells in one or two of these cases were completely exenterated except for orbital extension. In the others some of the most anteriorly placed cells and the orbital extensions showed disease.

The sphenoid showed inadequate opening in most cases, in spite of the fact that I had fought granulation tissue stubbornly in those patients operated on intranasally by me.

An explanation was found for the lack of roentgen-ray evidence often furnished in definite ethmosphenoid disease. Even in patients with an abundant discharge from the sinuses, the gross pathology found on operating was very slight, certainly not enough to be demonstrated by the roentgen ray.

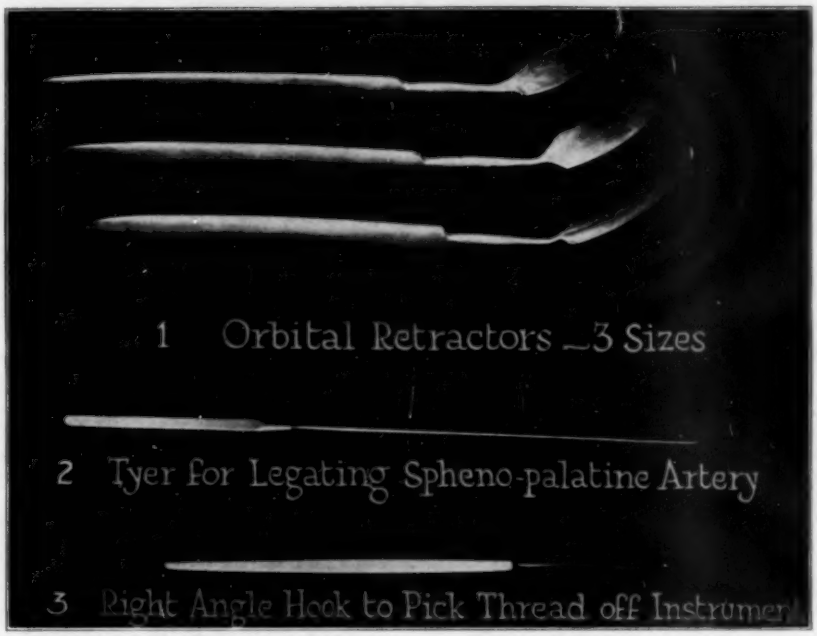

Fig. 19.—Instruments used by author.

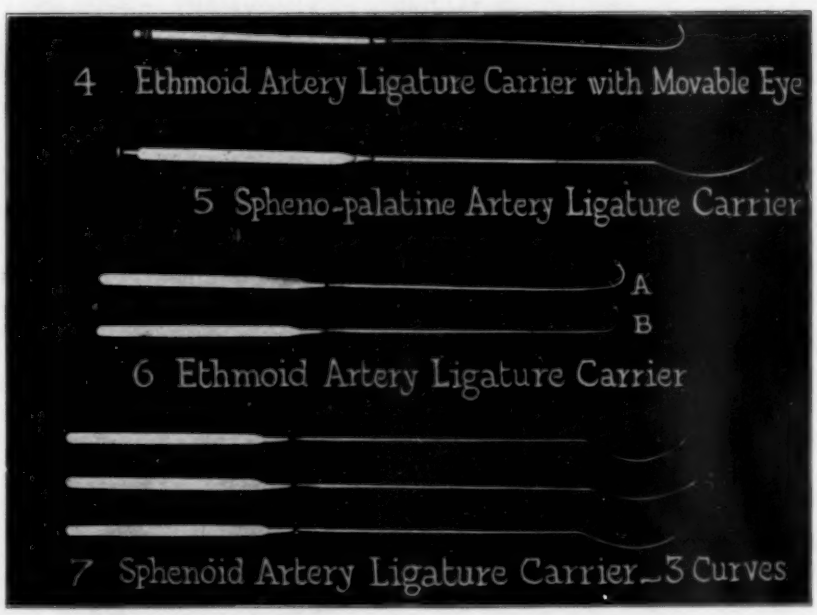
4 Ethmoid Artery Ligature Carrier with Movable Eye
5 Spheno-palatine Artery Ligature Carrier
A
B
6 Ethmoid Artery Ligature Carrier
7 Sphenoid Artery Ligature Carrier—3 Curves

Fig. 20.—Instruments used by author. Ligature carriers with movable eye (4 and 5).

PATHOLOGY

Tissue taken from the sinuses at operation has been examined histologically by Prof. Frank Blaisdell. In every case inflammatory changes were present even in those patients in whom gross pathology was slight. The surface epithelium was frequently found fragmented, and at times changed to pavement variety. The submucous connective tissue was often found to be edematous with round and plasma celled infiltration. The glands were often shown to be hyperactive and frequently cystic. Marrow of the underlying bone frequently showed myxomatous or fibrous changes.

There is considerable swelling and discoloration about the eye, which subsides in a few days without further trouble. Two patients have had some subsequent trouble of an acute nature. One had a swelling about the eye, and seven days following the operation I passed a small sound up into the frontal sinus, established drainage and there has been no trouble for five months. Another patient with frontal sinus involvement had some trouble. The opening from his nose into the frontal sinus became closed, and a fistula formed at the site of the incision. I reoperated under local anesthesia and, after cleaning out considerable pus, placed a rubber drainage tube into the sinus from the nose, closed the skin incision again completely, and left the tube in place for a few days. Since then I have been passing sounds to keep the unwilling opening patulous. That brings me to the one real objection to this type of frontal drainage.

When the frontal process of the superior maxillary bone and the lamina papyraceae have been removed, the soft tissues have a tendency to draw toward the median line. In so doing they are inclined to close off the frontal drainage too soon. I am curious to know why it occurs only in some cases. Several of my patients with extremely bad frontal sinuses recovered without any attempt on my part to keep the frontal opening patulous. The few that have given me trouble I have handled successfully by the constant passage of sounds; so I have made this a routine procedure in all cases. Preserving as much as possible of the lamina papyraceae may be an important factor in the maintainance of drainage.

RESULTS

Operative results which, after all, measure the value of any surgical procedure, have, on the whole, been satisfactory. I am convinced that, unless we can find some more potent remedy, surgery must afford whatever hope of cure certain types of sinus cases can expect. Such noses on which operations have been performed have gone through a destructive performance and are, technically speaking, never normal again. It is surprising how little the loss of nasal structures troubles the average patient. Getting rid of all discharge is very difficult—I will not say

impossible because it is done in some cases and better technic may perform wonders in the future. At present, the best I can say for this operative technic is that some patients are free from discharge, while others have more or less discharge. All patients on whom I have operated have been benefited, both as to discharge and with reference to symptoms complained of, but I must frankly state that there are disappointments enough to keep invention stimulated if not discouraged.

REPORT OF CASES

On account of lack of space, only a few typical cases will be described.

CASE 1.—Dr. L., aged 37, was first seen Sept. 12, 1924. He had "caught cold" three months before, and had a low grade sinus infection. Previously he had had a septum and ethmoid operation performed elsewhere. He was fairly comfortable and was able to do his work up to May 18, 1925. He then complained of pain in the right frontal region. A discharge from the nose was present. The roentgen-ray report stated that pansinusitis on the right was present without fluid levels, with very definite changes of polypoid nature. Greenish yellow pus was washed out of the right antrum. The diagnosis was chronic purulent pansinusitis of the right side.

May 25, an external frontal-ethmosphenoidectomy and an intranasal antrum operation were performed. All sinuses were found full of pus and polypoid tissue.

June 4, ten days after operation the patient went back to work (dentistry). He was "feeling fine." August 14, he was discharged as cured.

July, 1926, he has had no further trouble up to this date. No disfiguration or deformity resulted from the operation.

CASE 2.—Dr. S. was first seen January, 1924. He gave a definite history of sinus infection. A roentgenogram showed a rounded mass of soft tissue in the right maxillary sinus and fluid density in the left. Both were washed out; the right was clear, the left showed pus.

January 11, a submucous resection was performed and both antrums were opened. The patient continued taking treatment until February 28. As there was no headache or nasal discharge, the patient was discharged from the hospital.

Oct. 10, 1925, the patient had had recurrence of frontal headache off and on since August, 1924. There was constant discharge from the left side of nose. The antrum was found well opened, with pus coming from the upper sinuses. A roentgenogram showed that the left frontal sinus was gray. The diagnosis was chronic purulent frontal sinusitis and probable ethmoiditis.

March, 1926, the patient still complained of headache and great discomfort on the left side of face. The antrum was found to be well opened. A roentgenogram showed the same picture as before.

April 5, 1926, external frontal-ethmosphenoidectomy on the left side was performed under local anesthesia. Much pus was found in the frontal sinus; the ethmoid region was distinctly diseased. The patient made a quick recovery; the incision healed by primary union. Sound no. 16 French was passed into the frontal sinus daily by the patient himself. May 5, all symptoms had disappeared. The sinuses were well and the nose was clean, with no visible deformity.

CASE 3.—Mr. J. H. M., aged 61, was first seen Oct. 5, 1922, with the complaint of purulent discharge from the nose, arthritis and headaches. He had had three operations on the nose performed elsewhere.

At the time of examination, there was considerable discharge from both sides of the nose. The septum was deviated and space was poor. A roentgenogram showed an unusual degree of opacity in practically all the sinuses. Both antrums,

which were full of disintegrated, foul pus, were washed. Pus still came from other sinuses immediately after washing the antrums. Nov. 23, 1922, under local anesthesia, a submucous resection, intranasal antrum and ethmosphenoid operation were performed. There was considerable relief for a short time, but the discharge and symptoms demanded further endeavor.

Jan. 27, 1923, under local anesthesia, the ethmoid and sphenoid regions were again examined intranasally.

May 5, under local anesthetic, the right sphenoid was again opened intranasally in an effort to combat granulation tissue.

Feb. 1, 1924, the ethmoids and sphenoids were again examined and curetted intranasally. October 31, the patient still had pus in the nose although less than formerly. His back was very sore and stiff. A good opening into the antrums was present. Some pus was in them at times, but usually they were practically clear. December 5, tonsillectomy under local anesthesia was performed.

May 26, 1925, as there still was considerable pus from the upper sinuses and the general condition demanded relief, an external frontal ethmosphenoidectomy was performed on the left side under local anesthesia. Infection was found in the frontal sinus, and some anterior ethmoid cells were found unopened and diseased; there was also some orbital extension of diseased ethmoid cells. The patient made a good recovery, but on July 1 noted a swelling at the site of incision. This was opened a couple of times and apparently healed. October 9, an external frontal-ethmosphenoidectomy was performed on the right side.

Jan. 2, 1926, swelling on the left side at the site of the former trouble was noted again. Under local anesthesia, an operation was performed in the same manner as before on the left side. There was considerable pus in the frontal sinus, closed off from the nose because of the apposition of the orbital structures to the ostium frontale. Opening from the frontal sinus into the nose was maintained by a rubber drainage tube. The patient made a quick recovery with primary union of the incision. After drainage, the tube was removed, and a no. 12 French sound was inserted from the nose into the frontal sinus. The patient was taught to pass the sound, and he passed it daily. Both frontals open into the nose, which is very much better. At times, there is still some pus. There is also great difficulty in keeping the opening into the frontal sinus patulous, even though the patient passes the sound daily. In this patient, the condition, even after this long experience, is still a problem. However, he is much better than when I first saw him. His case represents the most difficult type of pansinusitis one is called on to treat.

Case 4.—M. H., a youth, aged 17, was first seen May, 1923, with the complaint of tenderness over the left eye, and a purulent discharge from the left side of nose. Intermittent headache of two years' duration was present. Five months prior to examination, an acute infection accompanied by fever and severe headache was present. Sometimes the throat is sore, and occasionally the ears feel "stuffy." The roentgenogram showed that there was a round soft tissue swelling projecting about 1.5 cm. into the anterior outer portion of the left maxillary sinus. This had a smooth rounded posterior surface. There was heavy density in the left frontal and left ethmoid sinuses.

May 29, under local anesthesia, the ethmoids and sphenoids on the left side were curetted; the frontal sinus was probed, and an opening was made into the antrum. The patient was very much better for a while. In October, the nose became "stopped up" again, and some discharge was still present. October 5, under general anesthesia, the tonsils were removed and an intranasal ethmoidectomy was performed. The frontals were also probed. This operation afforded some temporary relief, but the discharge continued, which was always worse on the left side. There was a good opening into the left antrum; it was washed frequently and the water returned clear.

April, 1926, the patient complained of frequent headache, which was almost continuous for two weeks. Pus was coming from both sides of nose but more so from the left. Roentgenograms for comparison of films were taken May 24.

Stereoscopic study in the standard and in Water's position showed the left frontal sinus about the same as before. The left ethmoids were still very dense, and a little density appeared in the right ethmoids.

April 16, 1926, under local anesthesia, an external frontal-ethmosphenoidectomy was performed on the left side. Creamy pus appeared under pressure in the frontal; the ethmoids were full of polypi and pus; the sphenoid was full of milky, jelly-like secretion. A posterior submucous resection was performed and the floor of the sphenoids was removed.

The patient left the hospital April 23. Sounds nos. 12 and 16 have been passed into the frontal each day since, but there is still some swelling and a little granulation tissue in the sphenoid region. The patient is feeling much better, and says the "heavy feeling" in the head has entirely disappeared. Headaches have not recurred since the operation.

Stanford University Hospital.

TWO ANATOMIC PREPARATIONS OF THE TEMPORAL BONE FOR TEACHING PURPOSES

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MONTREAL

During the recent otolaryngological meetings held in Montreal from May 30 to June 5, 1926, a cabinet of prepared specimens and teaching models was exhibited. These included thirty or forty temporal bones, cut or drilled to show various structures. The bones were whitened beforehand; the semicircular canals, nerves, arteries and veins were painted different colors, and the specimens were mounted.

The number of inquiries made at the time leads me to describe in some detail how two of the preparations are made; I do this also for the benefit of those connected with universities where specimens of this nature may be desired for teaching purposes. This description is prompted, further, by the fact that Professor Nager, during his recent trip to this continent, was interested in the work and made notes of all the particulars, saying that he would like to add them to his collection in Zurich.

Every one who teaches or demonstrates in otolaryngology knows how difficult it is to explain to a student the appearance of the normal drum, and what there is to be seen. Remembering Politzer's drawings of the drum, ossicles, etc., which I saw as an undergraduate, it occurred to me some time later that the ideal way would be to have a specimen prepared showing the normal drum and ossicles actually in position. Anatomic drawings often lead to confusion as regards both the size of structures or organs and their relations to one another.

The idea in the first specimen (fig. 1) is to have an ear speculum adjusted and fixed in the external canal so that by means of a head mirror and reflected light the student could see the normal picture of the drum with the handle of the malleus, the long process of the incus showing through and the triangular cone of light. After having this mental picture firmly fixed, he could turn the specimen around and see the drum from behind with the attached ossicles. In this way both sides of the drum could be carefully studied.

To prepare this specimen, it is necessary to procure a temporal bone in which the drum and ossicles are intact. It is not an easy matter usually to get one as described, but if great care is exercised in macerating the bone, it can be done. This is the hardest part of the procedure.

When a suitable bone is selected, the parts not needed may be removed, such as part of the petrous, the squamous portion and the mastoid. A saw and a dental drill are the only instruments that are required.

As is shown in figure 2, the tegmen tympani and enough of the petrous portion of the bone is removed to expose the whole drum and ossicles from behind. The eustachian tube, the carotid artery and the jugular bulb may also be opened to show their position and course, and suitably painted.

Fig. 1.—Ear speculum fixed in the external canal.

After removing the bone the next step is to fit a fairly large-sized aural speculum into the external canal. The canal may have to be enlarged slightly by means of the drill in order that the speculum can be made to fit snugly and at the same time to give a clear view of the drum. It is best to fix the speculum just inside over the entrance to the bony canal, to get as near as possible the same distance approximately from the drum as in life (fig. 3).

When this is done, all that remains is to mount the bone on a stand with the speculum fixed in place. With a specimen of this kind it is

an easy matter to demonstrate to a student the different parts of the anatomy, and by means of a head mirror and reflected light the drum picture can be studied much better than in the living subject. The student is able to correlate his ideas as to the size and position of the ossicles from both sides of the drum, and the mental picture thus gained is always remembered.

Although not a necessity, an enlarged model of the drum is a great asset, especially when demonstrating to a group. In this way, six or eight students can be shown the drum picture from both sides, and the various parts may be explained.

Fig. 2.—Drum and ossicles, posterior view.

The accompanying photographs show a model of this kind, and for any one who has done any work in plaster it is not difficult to make.

A round, flat piece of tin is used in making the drum, with a diameter of 12 cm. A segment is cut out from the center to the periphery, and the free edges are soldered together forming a shallow cone. The degree of the concavity should approximate that of the normal drum, and depends on the size of the segment removed.

A mold is now required in which to embed the drum, and for this purpose a thick, cardboard box about 24 by 16 by 6 cm. is suitable. Enough plaster is mixed with water to make a thick paste, and the mold, lying flat, is half filled with the mixture. The metal drum is then placed in the center of the plaster of Paris, keeping in mind that when the model is mounted on end the drum will be in the proper position, i. e., slanting downward and forward. The remainder of the mold is now filled with plaster, the drum being embedded half way through the center.

Fig. 3.—Aural speculum fixed in the entrance of the bony canal.

Before the plaster becomes too firm, a piece is cut out of the center down to the drum, and the opening is enlarged to form the external canal with a long diameter of about from 10 to 11 cm. If this is done before the plaster hardens, it is an easy matter to smooth down the rough edges and make a canal similar to the normal canal. As the canal is 11 cm. in its greatest diameter, and as the drum is 12 cm. across, it

is still embedded in plaster for at least 1 cm. The cardboard mold is removed, and in the same way the plaster on the other side of the drum is cut away, but this time more extensively, as the attic is shown. The edges and corners are taken away with sandpaper, and the plaster cast is set aside to dry.

The malleus and incus are made of plastic wood (an alcoholic preparation of wood pulp) which can be molded like putty. Each ossicle may be made entirely of this preparation, or a support made first of two small

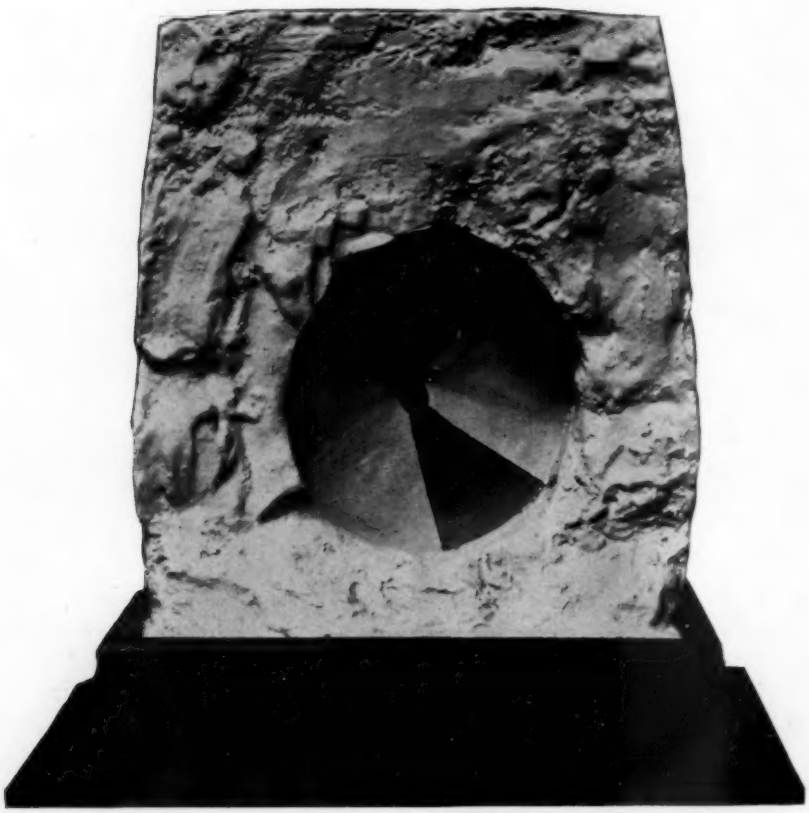

Fig. 4.—Metal drum in plaster of Paris mold.

pieces of wood, held together at the proper angle with adhesive plaster and covered with plastic wood. This wood substance being soft is easily molded, but it soon hardens and can be cut or sandpapered like ordinary wood.

When the ossicles are made, all that remains is to fix them in place, paint the model and mount it. The photographs show the details so well that further explanation is unnecessary.

The model is given a coat of shellac and later of enamel paint. In our specimen the ossicles and light reflex were painted apple green as contrasted with the rest, which was painted cream. A dull, black stand sets off the whole model.

The second specimen is a metallic cast of the internal ear, modified from the work of Siebenmann and Körner.

Fig. 5.—Model of middle ear, showing drum with malleus and incus in position.

According to Ballance, three types of "corrosion preparations" are distinguished in German books: (1) those in which the bone is macerated and all soft parts removed prior to injection with fusible metal; (2) those in which the injection is made immediately on removal of the bone from the body, without previous treatment, and (3) those in which the specimen is treated with some fixing agents, such as formaldehyde, and then dried previous to injection. The first method gives the most complete casts, while the second shows more clearly perhaps the direction in which infection is most likely to spread.

Our specimen falls into group 1, but, instead of the whole of the temporal bone being injected, just the semicircular canals, vestibule and cochlea are filled with metal, while the rest of the bone is left in situ or enough of it at least to show the position and relation to adjacent parts.

As specimens of this kind are ideal for teaching purposes or for an anatomic collection, it is hoped that the following details in their preparation will be of some help to those who are interested in this line of work.

METHOD OF PREPARATION

A temporal bone is used, which is first cleaned by maceration and dried. In preparing the bone it is best to make a small opening in the superior semicircular canal, just behind the crista petrosi, with a file (to provide for the escape of air during the injection). (An otherwise perfect specimen was spoiled owing to an air bubble. In this case the air prevented the metal filling the superior canal, and consequently a gap was left at the top.) Next, by means of narrow strips of adhesive plaster about one by one-fourth inch, which overlap each other, the superior surface is covered, especially over the opening into the superior canal.

According to the method of Siebenmann, quoting from Ballance, "Linen is pasted over all the natural and artificial openings on the anterior, posterior and external surfaces of the temporal bone, except only the median opening of the carotid canal (in order that no plaster may get into or over the openings themselves when the bone is subsequently embedded in plaster of Paris." This is, of course, essential when the whole of the bone is to be injected, but when the internal ear alone is to be filled with metal, the adhesive covering the opening into the superior canal is all that is necessary.

A funnel from 15 to 20 cm. long is made of stout cartridge paper rolled into a tube and fixed with adhesive plaster or glue. The injection is made through the oval window, so the small end of the funnel must enter well and fit snugly into this opening. It can be held there easily with adhesive tape. A little plaster of Paris paste around the junction of the funnel and the oval window prevents leakage of the metal. In an infantile temporal bone before the external canal is well formed, this can easily be done as the oval window is accessible, but in an adult bone part of the external canal has to be removed in order to adjust the funnel.

The internal ear is a closed cavity as far as the injection of fusible metal is concerned, so there is no danger of its running out.

The bone is now heated to 100 C. to prevent chilling of the metal, and then placed firmly in a vise. A sufficient quantity of Wood's fusible metal is melted in a vessel provided with a spout, and then

Fig. 6.—Specimen showing relation of canals and cochlea to different structures in the temporal bone—posterior view.

Fig. 7.—Same specimen showing relation of canals and cochlea to different structures in the temporal bone—anterior view.

poured into the funnel quickly in as steady a stream as possible, until it is half full.

The whole specimen is now left to cool, and in a few minutes it may with advantage be placed in cold water.

When the preparation is thoroughly cooled and dried, the paper funnel is removed and the metal cone cut off at the oval window with a file.

The adhesive is now taken off, and the bone is softened by means of weak acid. From 5 to 10 per cent hydrochloric acid is best for this purpose, as nitric turns the bone yellow (due to a xanthoproteic reaction). The specimen is covered with the acid and left for four or five days, or until it begins to soften. Then the bone surrounding the internal ear is picked away with a small knife. As the acid is weak and acts slowly, just the surface of the bone can be taken away piecemeal. This process has to be repeated, i. e., immersing the bone in the acid for a few days and scraping away the softened part. When the injected canals appear, it is an easy matter to follow them around and remove the overlying bone. In the same way the whorls of the cochlea are uncovered. The rest of the temporal may be left intact and hardened by placing the specimen in graded alcohol. All that remains now is to mount the bone and paint the metal cast of the internal ear the conventional green. The specimen shows clearly the relation of the canals and cochlea to the different structures in the temporal bone, as may be seen by the photographs.

TONSILLECTOMY BY NERVE BLOCK ANESTHESIA

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PHILADELPHIA

Since tonsillectomy is a necessary operation, it should be performed with the least amount of risk to the patient, and all tonsillar tissue should be removed completely. A general anesthetic undoubtedly adds considerable danger to the operation, especially in the presence of pulmonary, renal and cardiac diseases, exophthalmic goiter, diabetes, syphilis, anemia, status lymphaticus and other conditions. In addition, a general anesthetic may predispose to pneumonia, lung abscess, hemorrhage or asphyxia. Therefore, several years ago, I decided to perform a nerve block tonsillectomy. I consulted the latest authorities concerning the nerve supply to the tonsil; as I was unable to obtain this information from them, I was compelled to seek it in the dissecting room.

After making careful dissection studies, I found that the tonsil is supplied by seven nerve filaments, and that if each one of these seven filaments is anesthetized, the tonsillectomy is entirely painless; otherwise it is not.

MODE OF ENTRY OF FILAMENTS

The middle and posterior palatine nerves emerge from the palatine canals 0.5 cm. internal to the last molar tooth, and proceed to supply the upper part of the tonsil. These are not important, as they can be anesthetized easily at the canal orifices.

The lower half of the tonsil is supplied by five filaments from the glossopharyngeal nerve. These five filaments branch off from the nerve at different levels and enter the tonsil in the following way: Two filaments enter the middle of the tonsil posteriorly, one near the external border and the other near the internal border; two enter the tonsil midway between the two just mentioned and the lower pole; one filament enters at the lower pole.

The pain caused in local tonsillectomy is due to injecting the fluid superficially into the anterior and posterior pillars or into the tonsil itself; it does not reach the five filaments from the glossopharyngeal nerve which supply the lower pole.

METHOD OF ANESTHETIZING

First, the sites of injection are painted with half strength tincture of iodine. As mentioned in the foregoing, the upper pole of the tonsil is anesthetized by blocking the middle and posterior palatine nerves by injecting 1 cc. of 1 per

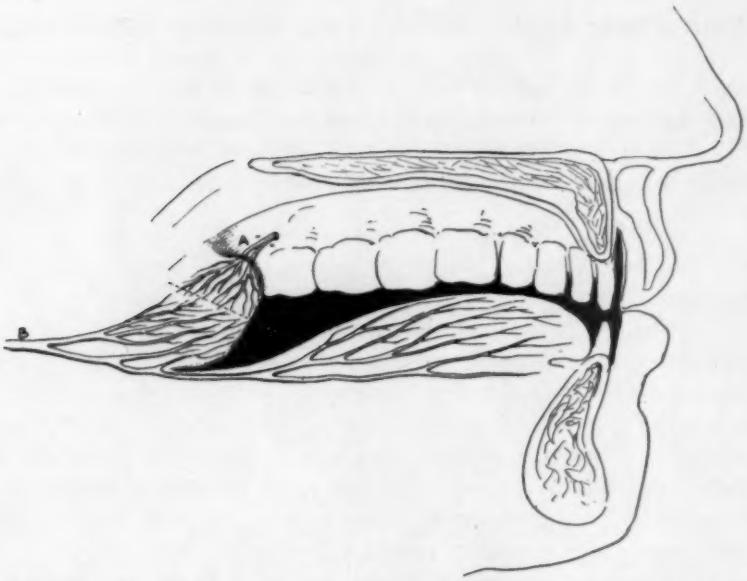


Fig. 1.—*A*, midpalatine and postpalatine nerves to upper part of tonsil; *B*, glossopharyngeal nerve, showing mode of entry of tonsil sprigs.

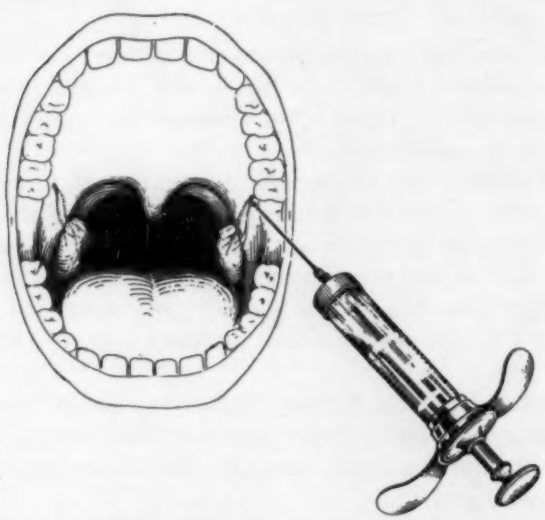


Fig. 2.—Blocking midpalatine and postpalatine nerves at foramina, just internal to last molar.

cent procaine hydrochloride, together with a minute quantity of epinephrine at the posterior corner of the hard palate (I never use cocaine).

The lower pole is anesthetized by blocking each one of the five filaments aforementioned with 0.5 cc. of solution. This can be done after the upper pole is anesthetized by pulling the tonsil out of its bed with a tenaculum (which is a painless procedure) and injecting the anesthetizing fluid behind the tonsil at the particular points. It may be necessary to use a curved needle to reach to the two essential points close to the posterior pillar. In most patients, however, these two points near the posterior pillar can be reached through the anterior pillar. Often one puncture of the anterior pillar is enough, the needle being pushed deeper to reach the posterior filaments and swung up and down as desired.

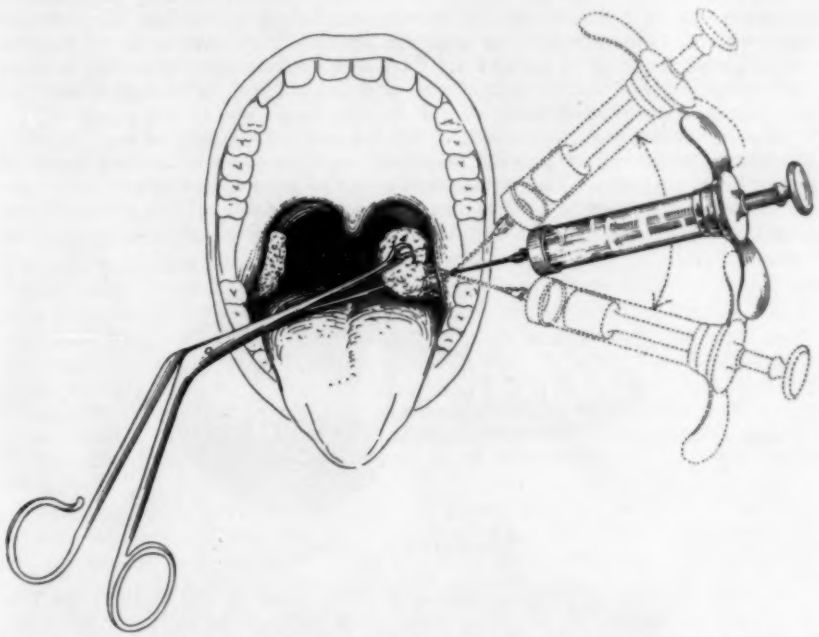


Fig. 3.—Tonsil pulled from its bed after blocking the midpalatine and posterior palatine nerves. The needle is inserted through the anterior pillar midway between the middle of the tonsil and its lower pole, so that it can be swung up and down. The point of the syringe behind the tonsil is shown by the dotted line through the anterior pillar.

I have performed over 100 of these operations without pain, even on screwing the snare slowly instead of snapping it quickly. This procedure causes a minimum amount of bleeding, often none, instead of so much that the mouth is full of blood, as occurs when the snare is snapped shut quickly.

1819 Spruce Street.

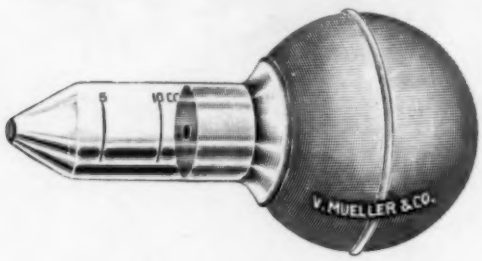
Clinical Notes

A SPECIAL SYRINGE FOR DISPLACEMENT IRRIGATION OF THE NASAL SINUSES*

ARTHUR W. PROETZ, M.D., ST. LOUIS

A short time ago, I[1] described in this journal a new method for the introduction of fluids into the nasal accessory sinuses, which I termed "displacement irrigation." It consists, briefly, in inverting the head; introducing fluid into the upturned nose, and causing it to enter the sinuses by exhausting air from them and allowing the fluid to replace it. Various solutions have been employed for their cleansing and therapeutic effects, and iodized oils have been introduced for roentgen-ray examination.

The apparatus that was used in the beginning consisted of a 5 cc. glass plunger syringe for introducing the fluid, and an electric suction pump to produce the vaccuum. This arrangement proved somewhat cumbersome, especially in the roentgen-ray laboratory, and necessitated a trip to the roentgenologist with the patient in order to introduce the oil at the proper moment.



Displacement syringe

In order to simplify the procedure as much as possible, and at the same time to prevent the application of a dangerously high vaccuum by untrained operators, a special rubber bulb suction syringe has been devised, which is illustrated here. This serves at once for introducing the solutions into the nose, and for applying the necessary intermittent vaccuum.

The bulb is of such thickness and resiliency that it will lift 5 inches of mercury and no more. Its capacity is sufficient to permit of ample exhaustion of the nasal chambers and the sinuses. The glass tube, which adapts itself comfortably to the nostril, is graduated at 5 and 10 cc. for the measurement of iodized oil.

This apparatus is simple, and is effective and safe in the hands of persons unaccustomed to the application of suction to the nose. By its use, the roentgenologist himself may introduce the oils, although he should be warned against doing so without specific instructions from the laryngologist in each case.

234 University Club Building.

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* From the Department of Otolaryngology, Washington University School of Medicine.

1. Proetz, Arthur W.: Displacement Irrigation of Nasal Sinuses, Arch. Otolaryng. **4**:1 (July) 1926.

TONSILLECTOMY WITH THE TONSILLECTOME

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The following has been prepared as a plan of procedure and explanation of technic in the use of the Arrowsmith-Sluder tonsillectome, as it is employed at the Kings County Hospital. These instructions have been used for members of the house staff for the past few years, and have been found satisfactory. The technic here outlined can be followed with any type of guillotine or fenestrated tonsillectome which comprise those of Sluder and their modifications.

It is conceded that the position of the patient, the type of mouth gag, the illumination and the type of tonsillectome may be left to the individual operator.

To obtain exposure of the tonsil in its entirety, and especially to avoid missing the lower pole of the tonsil, the tongue depressor is introduced so as to depress the side of the tongue at its juncture with the anterior pillar. This puts the anterior pillar on the stretch, and in so doing gives a complete exposure of the free tonsillar surface.

The instrument is introduced with the handle pointing toward the feet, and is slid along the dorsum of the tongue until it is brought under the lower pole of the tonsil, which it engages. The instrument is now raised and the handle is brought to the opposite angle of the mouth while the fenestra is encircling the entire tonsil posteriorly. This brings the instrument from a vertical to a horizontal position, or causes it to describe an arc of 90 degrees. The tonsillectome is now held in as horizontal a position as is possible, and is drawn slightly backward. This creates a rounded bulge anteriorly, which is evidence that the tonsil has been elevated and is in its maximum position of displacement. With the instrument held firmly and steadily, the forefinger or the thumb of the other hand forces the bulge (tonsil) through the fenestra and holds it there. The blade is now slowly brought into its closed position. It might be well to insert here that long finger nails are accountable for cutting through many anterior pillars in this step of the technic. The nail of the finger which is used to force the tonsil through the fenestra should be closely trimmed to avoid the possibility of a button holed pillar.

While the blade is being forced into its closed position, the line of union or adhesion of the tonsil with the anterior pillar, which marks the beginning of the line of cleavage between these structures, must be ascertained. If this line of cleavage is overlooked, a varying amount of anterior pillar will be forced into the fenestra and will be sacrificed when the blade is driven home. If any of the anterior pillar has been depressed, the pressure of the forefinger or thumb is slowly released, and the instrument is pulled backward until the free edge of the anterior pillar is encountered. The blade is now closed and the engagement of the complete tonsil is accomplished. While the blade is being driven home, the finger pressure regulates the position of the edge of the anterior pillar so as to prevent sacrifice of anterior pillar tissue. Only when the blade has been driven home entirely should the controlling pressure of the finger be withdrawn.

The instrument is now pulled toward the opposite side. This will put the palatal structures of the side being operated on the stretch; then the rim of the instrument should be readily felt through the anterior pillar. When such is the case, the handle is swung over to the other side of the mouth, and the tonsil is seen to be held between the edge of the blade and the rim of the fenestra. The tonsil is now removed by the more complete closure of the blade. After snapping through the blade, the instrument should act as a shelf on which the removed tonsil rests while the instrument and tonsil are being withdrawn.

If the entire tonsil is not engaged in the fenestra of the tonsillectome, the rim of the fenestra cannot be felt in its entirety. This will necessitate a readjustment.

A knowledge of the relations of the structures and the instrument are of value in this operation.

Before the instrument engages the tonsil, the structures in order are: first, anterior pillar; second, tonsil; third, instrument. After the instrument has properly engaged the tonsil, the order is: first, anterior pillar; second, instrument; third, tonsil.

When the tonsil is not properly engaged, the order is: first, anterior pillar; second, tonsil; third, instrument; fourth, tonsil.

COMMENT

The technic as it is here outlined should be help toward a clearer understanding of the steps of the operation and prevent unnecessary sacrifice of tissue in tonsillectomy, at the same time dignifying the procedure as an operation which requires skill and understanding. The aforementioned technic is advocated for children under 8 years of age, in whom the tonsils are nonadherent. Throats that have suffered one or more attacks of tonsillitis or of peritonsillar abscess usually present adherent tonsils. In such cases and in children over 8 years of age, I advocate the removal of the tonsils by dissection. To obtain satisfactory results, one should suit the technic to the requirements of the individual case.

I do not wish to detract from the merits of the technic as it was originally advocated by Sluder,[1] or by Whillis and Pybus.[2] The technic described here is essentially that of Whillis and Pybus.

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1. Sluder, Greenfield: A Method of Tonsillectomy by Means of a Guillotine and the Alveolar Eminence, J. A. M. A. **56**:867 (March 25) 1911.

2. Whillis, S. S., and Pybus, F. C.: The Enucleation of Tonsils with the Guillotine, Lancet **2**:875 (Sept. 17) 1910.

PROGRESS IN OTOLARYNGOLOGY

Summaries of the Bibliographic Material Available in the Field of Otolaryngology

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PLASTIC SURGERY

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The developments in plastic surgery during the year have been more in the direction of extending the field than in the introduction of new methods. This was to be expected. In this, as in other branches of surgery, the progress has followed a definite order. First was the occasional application of the method to a particular area, in this instance the faciomaxillary. With increase of familiarity, the recourse became something more than occasional. Then followed recognition of the specialty by hospitals and universities, and from this, in turn, a standardization of procedures. Finally, it became obvious, in practice, that the principles involved could be given a considerably wider extension, especially at the hands of those accustomed to the work.

When the subject was taken up seriously by the hospitals, the first and most natural development was on the clinical side. Inevitably, as the clinics grew in importance, the stage of experimentation followed, accompanied, or succeeded, by histologic research. On the educational side there have been accompanying phenomena of recognition, in lectureships, associate professorships with designation of special duties, the appointment of a professor of faciomaxillary surgery (Pennsylvania), a professor of faciomaxillary war surgery (Harvard) and finally, this year, the naming of a professor of plastic surgery as integral to the hospital's surgical branch (New York Post-Graduate).

REVIEW OF THE LITERATURE

The notable literature of the year is to be distinguished by its relevancy to this order of progress, and practically all of it has emanated from within the United States. Since much dependence must be placed on skin grafting, and since the pedicle graft has the disadvantage of leaving a visible scar, attention has been concentrated on the possibility of utilizing full thickness grafts, brought from less exposed parts. The difficulty has been that the pedicle graft is the more certain instrument since it carries its own uninterrupted vascular supply, whereas the full thickness (Wolfe) graft is necessarily detached from all its sur-

roundings and must find the means of life in the place to which it has been transplanted. Not so long ago, a 50 per cent average of success was considered high. Nowadays the average is 85 or 90 per cent. Staige Davis [1] has presented the results of a series of studies at Johns Hopkins Hospital, and gives a convincing picture of the process by which a new arterial circulation is built up in the graft from its contact with the arterioles of the bed. But since it has been demonstrated in practice that this system of revitalization is defeated when the pressure applied is either too great or too little, equal interest attaches to the experiments described by Ferris Smith,[2] who was able to establish the proper degree of pressure at 30 mm. of mercury.

Another instructive example was supplied by Frederic W. Bancroft and Charles S. Rogers [3] in their comprehensive study of the effect of burns, one of their conclusions being that skin grafting soon after the sloughs separate should be given precedence over correction of deformities, since if grafting is delayed there is formation of unhealthy anemic granulation tissue with a scar tissue base. This accords with the success achieved in the immediate skin grafting of burns, of which the work of Lyle [4] is an interesting example. A valuable companion work is that of J. Shelton Horsley,[5] who studied the processes by which cicatricial contractions are set up following burns. That the contractions may be due to changes in structure in the connective tissue even when the epithelial covering may appear to be unaffected, and that, on a granulating surface, covering by Thiersch's method of skin graft will obviate the contractures that would otherwise occur, are manifestly germane to this subject. His conclusion that correction of cicatricial contraction, once established, can be achieved only with full thickness skin is in line with clinical experience.

It may be said, however, that, interesting as this confirmation of clinical practice undoubtedly is, the real zest of the subject is found in the extension of plastic methods to cases in which the interest is enhanced by difficulty and uncertainty. One victory plastic surgery has to its credit is the repair, or the replacement, of the syphilitic nose.

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1. Davis, J. Staige (Baltimore), and Traut, H. F.: Blood Supply of Whole Thickness Grafts, Ann. Surg. **82**:871 (Dec.) 1925; A Method of Obtaining Greater Relaxation With Whole Thickness Skin Grafts, Surg. Gynec. Obst. **42**:710 (May) 1926. Davis, J. Staige: Treatment of Deep Roentgen-Ray Burns by Excision and Tissue Shifting, J. A. M. A. **86**:1432 (May 8) 1926.

2. Smith, Ferris: A Rational Management of Skin Grafts, Surg. Gynec. Obst. **42**:556 (April) 1926.

3. Bancroft, F. W., and Rogers, Charles S.: The Treatment of Cutaneous Burns, Ann. Surg. **84**:1 (July) 1926.

4. Lyle, H. M.: Skin Plastics in the Treatment of Traumatic Lesions of the Hand and Forearm, Ann. Surg. **83**:537 (April) 1926.

5. Horsley, J. Shelton: Causes of Cicatricial Contraction, Ann. Surg. **84**:185 (Aug.) 19296.

Defects after cancer excision also command attention. Wyeth and others have found that, especially after diathermic removal of malignant tissues, plastic repair can be successfully used. Even if the problem of recurrence remains, covering the defect and restoring the normal appearance is a great gain. Similarly, the employment of an extensive two flap method of covering a total breast cancer defect, as described by Richard R. Smith,[6] indicates what is uppermost in the minds of those who realize the possibilities of the art.

COMMENT

Numerous papers, descriptive of individual methods, have been published in the course of the year. All of them point to a continuous and widespread endeavor to perfect existing methods. Standardization has now reached such a stage that the devising of methods really new is rarely reported.

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6. Smith, Richard R.: A Two-Flap Incision for Cancer of the Breast. Surg. Gynec. Obst. **43**:95 (July) 1926.

ADVANCEMENT IN OUR KNOWLEDGE OF ALLERGY AS RELATED TO OTOLARYNGOLOGY DURING THE PAST TWO YEARS

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A review similar to the following, published in 1925, included literature which appeared up to about January, 1925, but did not include a complete survey of the literature of the year in which the paper was published.

Several noteworthy advances have been made since this time, chiefly, I believe, in the following lines: First, studies have been made concerning the local passive transfer of hypersensitiveness by intracutaneous injections of serum from a sensitive to a nonsensitive patient. The fact that such sensitized areas can be desensitized by treatment with its related allergen (or atopen) makes hypersensitiveness in human beings appear more than ever similar to experimental anaphylaxis in animals. Second, interesting studies have also been made with ephedrine, the active principal of an old Chinese drug, the action of which resembles epinephrine. Third, methods of treatment have been improved, chiefly, I believe, through the use of the intracutaneous injection of extracts in coseasonal treatment. Fourth, several complete and useful botanical surveys have also been published. These should make it possible in the districts studied for newcomers in the field to study and treat pollen disease intelligently. Fifth, interesting researches have been made in which the pollen content of the air has been carefully studied through the use of pollen plates.

If I were permitted to criticize the literature on allergy, my chief contention would be that the summaries of many of the original papers are incomplete. I do not believe that reviewers of literature should be held responsible for facts not referred to in summaries or conclusions.

LOCAL PASSIVE TRANSFER OF HYPERSENSITIVENESS AND DESENSITIZATION

As mentioned in a previous review, it was found by Preusnitz and Küstner that the skin of a normal person can be passively sensitized locally by the intracutaneous injection of serum taken from a hypersensitive subject. Local skin sensitiveness so induced is specific for the substance to which the donor of the serum is sensitive; that is, the skin of the newly sensitized persons will react locally with the formation of a hive on the intracutaneous injection of the allergen (or atopen) to which the donor of the serum reacts. These observations

were confirmed by de Besche and by Coca and Grove. The latter observers found that the skin of a small percentage of individuals is inactive and cannot be sensitized passively. They found, furthermore, that the skin of a recipient can be sensitized locally to several substances at the same time, and that such areas can be made to react separately to each substance. Furthermore, skin so sensitized can be desensitized separately by the injection of suitable solutions by each of the separate substances to which the skin is sensitized. Finally, that desensitization is specific for the substances used in the solution injected.

Levine and Coca more recently demonstrated the fact that the sensitizing substances in the serum of patients with hay-fever (which they called "atopic reagin") varies, as a rule, with the degree of the patient's sensitiveness; and that reagin can be neutralized in vitro by mixing the serum of a patient with hay-fever with its related atopen (or allergen), that is, the agent to which the patient reacts. It was found, however, that reagin does not neutralize atopen. They also made the interesting observation that the reagin contained in the serum of patients with hay-fever is not reduced by specific treatment with its related atopen. These studies are of fundamental importance in the development of our knowledge concerning the mechanism of reaction of patients with hay-fever, and it is urged that physicians interested in this work consult original sources rather than depend on the brief review presented here. More than ever, these experiments make hypersensitiveness in human beings appear similar to experimental anaphylaxis in animals, and support a contention of Zinsser's mentioned several years ago, that the fundamental difference between human and experimental animal hypersensitiveness lay chiefly in the fact that in animals the immune bodies reside chiefly in circulating fluids, while in human beings they appear attached to the tissues.

We are greatly in need of data concerning the passive transfer of sensitizing substances (atopic reagin) from donor to patient through the medium of blood transfusions. Studies in this line are important both from a theoretical and a practical point of view. In every instance of transfusion of blood, in which either the donor or the recipient is subject to hay-fever, asthma or hives, the case should be carefully studied and reported in detail. Transfusion of blood in the case of hypersensitive subjects is not without danger, and should be avoided except in the case of emergency. In two patients with asthma, one sensitive to milk and the other to horse dander, into whom I transfused blood in dire emergency, the transfusion caused an almost immediate reaction which was so severe that the lives of the patients were almost despaired of. It would be interesting to know whether or not sensitiveness can be transferred passively in this way to nonsensitive subjects, and

whether or not it is necessary for the recipient to be of allergic strain in order to be passively sensitized. Furthermore, it would be interesting to know whether or not the transfusion of blood from a sensitive subject could cause reaction in a patient whose blood contained the related allergens (or atopens). Berger's case is interesting in this respect, in that a profound reaction immediately followed the injection of normal serum taken from a patient sensitive to horse serum into a child who had already received enormous doses of horse serum given for the purpose of controlling hemorrhage. It would be interesting also to know whether or not physical allergy, of the so-called contact type, can be transferred passively. In one case reported by me, a huge transfusion exceeding 1,000 cc. of blood was given to a nonsensitive patient from a large plethoric donor who had an extreme case of urticaria dermographia. Following transfusion, the recipient was tested frequently for a period of several days by scratching the skin with sharp instruments. The patient did not react in a single instance.

NATURE OF AGENTS WHICH SENSITIZE

Since early work in this field, it has been known that animals can be sensitized solely with antigenic substances, that is, with proteins. This presumably is not true of human beings, as they can apparently become spontaneously sensitive to almost any substance, even to inorganic salts, and even, as I have attempted to prove, to the action of physical agents such as light, heat, cold and mechanical irritation. It is possible, as has been suggested by Wolff-Eisner, on the basis of Landsteiner's work, that the drug idiosyncrasies may be caused by hypersensitiveness to a newly formed protein elaborated through a combination between the drug and a protein body. Sensitiveness to such agents as inorganic salts, and to physical agents, such as light, heat, cold and mechanical irritation, may possibly be accounted for in this way, that is, through the elaboration of a new protein body in vivo to which the patient might be sensitive. Further study on this subject is necessary and urgent before definite conclusions can be drawn.

Considerable effort has attended a study of the nature of agents which tend to sensitize human beings, and some progress has been made.

It is well known that in normal persons histamine and tyramine hydrochloride can produce symptoms resembling a pollen reaction. Koessler and Lewis have recently demonstrated bronchospastic substances in old bacterial filtrates, which did not contain either histamine or tyramine hydrochloride. Their observations are, of course, important in relationship to so-called bacterial asthma. They also demonstrated the fact that typical bronchial constriction could be caused in animals by a reinjection of such agents as pollen extract, and that sensitiveness

induced by different varieties of pollen extract was specific for the type used in sensitizing.

Longcope demonstrated that guinea-pigs can be made highly sensitive to extracts of horse dander, and die in a state of acute shock when reinjected with this agent.

Caulfeild, Cohen and Eadie demonstrated that animals can be sensitized separately by several different factions which they obtained from pollen by precipitating and treating extracts in different ways. They showed through skin tests that each fraction showed individual selective specificity, and that tests with a specific fraction would often be positive when a test with whole pollen would give negative results.

Given the fact that agents of many different types under suitable conditions can sensitize, it is not to be wondered at that physicians working with patients in various districts and on patients of different ages, do not agree in their opinion concerning the importance of certain agents. Children more often than adults seem sensitive to foods. Peshkin digresses from this view, and emphasizes the importance of rabbit hair, which he thinks is responsible for a number of cases of asthma in children. He also mentions several drugs which commonly affect pharmacists.

In 1924, Cadham found that grain rust affected a number of persons who were accustomed to thrash wheat.

The majority of observers seem to adhere to the theory that pollen is the most common single offender. For this reason, the careful botanical surveys which have been made in a number of districts seem of fundamental importance in the diagnosis and treatment of hay-fever and asthma occurring in these districts.

POLLEN

Worthy of special mention is a survey in Chicago by Koessler and Durham, in that it was accompanied by pollen counts made after exposure of greasy slides to air in different parts of the city over a prolonged period of time. A sudden high rise in the pollen content of the air was noted about June 10. Another slight rise occurred about July 10, and finally a gross, prolonged rise occurred about August 20 and continued until about September 25.

Wodehouse has recently studied the morphology of pollens, and urges that they be examined in a moistened condition rather than when dry. This suggestion is perhaps simpler than that made previously by this writer, that pollen granules be examined in an absolutely fresh state before drying. Drying causes crinkling of the shell if it is thin walled (such as grass pollen). The thicker ragweed shells do not crinkle on drying. The characteristics on which Wodehouse bases his classification

are: first, character and arrangement of germinal apertures; second, adornment and texture of the exine; third, the arrangement of folds (observed when dry); fourth, shape, and fifth, size. Since drying frequently hides the germinal apertures, the examination should be made, as he mentions, when the pollen is moist.

ARTIFICIAL SENSITIZATION AND REACTION

Guinea-pigs can be consistently sensitized to foreign proteins by subcutaneous inoculations. Strange to say, this does not appear to be the case with human beings, except possibly in rare instances when a person of allergic strain becomes sensitive to arsphenamine or to an impurity which accompanies it after repeated inoculation. Animals can be sensitized not only by inoculation, but by treatment with foreign protein in less unnatural ways. For example, Heltwer and Kriz sensitized animals by injecting horse serum (not less than 0.5 cc.) into a closed loop of intestine. Shock occurred in sensitized animals after the injection of small amounts of horse serum into a ligated loop of intestine, and by the injection of large amounts (10 cc.) into an unligated loop. (The latter observation confirms the original experiments of Rosenow and Anderson.) The injection of a small amount of serum mixed with sodium fluoride into an unligated loop also caused shock. Heltwer and Kriz assumed that an increase in the intra-intestinal pressure was essential to the rapid absorption of a sufficient amount of undigested protein to cause shock in sensitized animals. Recent work by Walzer is illuminating in this and in other respects. He sensitized locally the skin of normal persons to egg in one case and to fish in another, through the intracutaneous injection of serum from one patient sensitive to egg and another sensitive to fish. After this he could produce reaction in the skin locally at the sites of inoculations by the feeding of egg in one case (which would produce a typical hive at the area sensitive to egg) and by the feeding of fish in the other case (which would produce reaction at the area sensitive to fish). These reactions were not only specific, but also desensitized their respective skin areas locally. This experiment was performed repeatedly and came out positive in all cases except in six of about fifty which were tested. In these six cases, the skin areas were proved to be locally sensitive by the local injection of appropriate antigens. This interesting experiment proves again not only that undigested protein can be absorbed in a majority of persons from an apparently normal gastro-intestinal tract in small amounts, but also that it can be absorbed in a sufficient amount to be a real factor in the causation of reaction in sensitive persons.

Alexander, Beck and Holmes demonstrate that shock can be caused in highly sensitive animals through treatment by inhalation with vaporous antigens if used in sufficient concentration.

THE EFFECT OF HEAT ACIDS AND ALKALIS ON SENSITIZING SUBSTANCES

Firth reports that animals sensitized to serum heated to 100 degrees react rather consistently, with symptoms of shock or death after reinoculation with heated serum. Animals sensitized with unheated serum react to heated serum to a much smaller extent or not at all. These results harmonize with Besredka's, who sensitized animals with raw and cooked egg and found that animals sensitized with cooked egg reacted more consistently to cooked egg than those sensitized with raw egg, and vice versa. The objection to Besredka's conclusions lay in the fact that he may have been working with a strong solution of ovomucoid in his experiments with cooked egg.

Interesting and practical are the careful and complete experiments of Gay, who found that the heating of ragweed pollen extract to 100 degrees for one minute reduced its activity when tested on sensitive patients. He found also that the heating of pollen extract to 60 C. for one hour reduced its reaction producing capacity markedly, and that if the same extract were heated in an autoclave, the activity was reduced to such an extent that mild sufferers from hay-fever would fail completely to give a positive skin reaction on intradermal injection of the solution. He found, further, that alteration of the hydrogen ion concentration within certain wide limits did not affect in any way the activity of the solution. This observation is of practical importance to those interested in making extracts for diagnostic or therapeutic purposes.

SKIN TESTS

Both Bernton and Kahn emphasize the fallibility of negative skin tests in patients sensitive to pollen. Caulfeild finds that different fractions of pollen extract obtained by chemical treatment vary in their capacity for producing skin reaction.

THE USE OF SERUM IN HYPERSENSITIVE SUBJECTS

Dangers attending the use of horse serum in patients sensitive to horses are freely admitted by all. It is known that patients sensitive to horse serum are not necessarily sensitive to horse dander, and vice versa. This does not mean that in any sense it is safe to use horse serum in a patient sensitive to horse dander, in spite of the fact that I reported a case showing that under exceptional circumstances this is actually safe. One patient, a physician, highly sensitive to horse dander both clinically and cutaneously, had twice withstood huge doses of horse serum almost without reaction.

Bernton, also Kahn, have each emphasized recently the fallibility of negative skin tests in subjects sensitive to pollen. This has been veri-

fied in relation to horse serum by Park, who found that patients with positive reactions sometimes gave negative skin tests. The fact is, a negative skin test with horse serum does not indicate that it is safe to use horse serum. Serums and intravenous injections of any kind, including arsphenamine, or vaccines, are not safe in hay-fever, asthma and hives, whether or not the patients seem specifically sensitive to the substance injected. Lamson's report is particularly illuminating in this regard, in that in his review of the literature of cases of sudden death following the injection of antitoxin, 34 per cent gave a definite history of hay-fever or asthma. If a careful inquiry had been made concerning a personal and family history of hay-fever and asthma in each of the cases reviewed, the percentage of positive results would, no doubt, be vastly greater. I believe all admit that serum should not be used in patients with hay-fever or asthma unless the indication is definite. Prophylactic doses of diphtheria antitoxin are, I believe, contraindicated. If one is faced with the necessity of using diphtheria serum, it is necessary to decide whether or not the dangers from serum are greater than the dangers of diphtheria. I, personally, do not believe one should hesitate to give serum in this situation, and even though Coca objects at this time to the method which he himself suggests for administering serum in patients sensitive to horse serum, I do believe it is the best method that we have so far, and should be used with care if sufficiently indicated.

TREATMENT

The radical treatment, cervical sympathectomy, tried by Kümmell in 1925, was repeated in two cases by Ramirez, who reports failure in the case of a unilateral resection operation. He states that if relief can be obtained, he believes it can be accomplished only through bilateral resection.

Stimulated by the suggestion of Pottenger that calcium might be useful in the treatment of asthma, Brown studied the calcium content of the blood in a number of patients, and states that a considerable proportion of those with asthma, hay-fever and eczema show calcium deficiency. Lintz reports favorable results through treatment with calcium iodide. These results have not been confirmed as yet by a sufficient number of observers to place calcium therapy and calcium metabolism in the exact niche in which it belongs.

Pritchard, Whyte and Gordon report favorable results in the treatment of chronic conditions of the lower respiratory tract with iodized oil, and state that this is a safe procedure both in diagnosis and in treatment.

Ramirez and Cole carefully studied the effect of roentgen-ray therapy in the treatment of asthma, and report that their records seem

to indicate that roentgen-ray therapy offers no advantage over other methods of treatment.

Rackemann, Graham and Scully, after an exhaustive study and most complete report concerning pollen therapy, state the following in their summary:

1. In the majority of cases, the routine treatment in one season has but little effect upon the degree of hypersensitiveness at the outset of the next season, or upon the rate at which the tolerance to ragweed can be raised during the next season.

2. Similar courses of treatment in different years are followed by similar end-results.

3. In those cases in which the courses of treatment have varied, it has been observed in about 20 per cent that a larger dosage was followed by a better end-result.

4. In at least 14 per cent of the cases, it has been possible to show that excessive dosage was responsible for poor end-results, and that in many instances the result was much better when a smaller dose and a less vigorous course of treatment was employed.

5. From this it is evident that success in treatment demands a course of doses of a size and extent which is optimal for the particular patient. What this means, so far as the underlying mechanism of hay-fever is concerned, is a problem, the solving of which must wait upon the collection of data of another kind.

Phillips recommends intracutaneous pollen injections especially in coseasonal treatment, and reports splendid results obtained in a remarkably short period of time. I have been able to confirm his results with his method modified to suit this district, and believe it promises to be the method of choice in the future. Running series of cases in parallel for comparison this year, I was forced by the apparent advantages of the intracutaneous method to discontinue the subcutaneous method altogether.

Papers by Bernton, Kahn, Brown, and as before referred to, by Phillips, on the effectiveness of coseasonal treatment each merit mention. For some reason coseasonal treatment was condemned in the early years of this work. I feel, as does Phillips, that the day may come when coseasonal treatment proves the method of choice.

Finally, additional reports by Thomas and more recently by Chen and Schmidt, indicate that ephedrine occupies a substantial place in the treatment of bronchial asthma and allied manifestations of reaction. Its effect, they state, is similar to that of epinephrine. The effect is not so marked, but it is more prolonged. Ephedrine possesses the additional great advantage of being effective when administered by mouth.

SURGICAL TREATMENT

Considerable interest attends the surgical treatment of the nose in allergic conditions affecting the nose and bronchial tubes. Opinions are divided concerning its efficacy in giving permanent relief in either nasal or bronchial allergy, even when a perfect local result is obtained.

Haseltine, in harmony with views previously expressed by Adam, Hollender and others, believes that asthma is often a systemic disease combined with local organic pathologic changes in the nasorespiratory tract. He recommends the exhaustive use of local diagnostic methods in cases of this kind, and suggests that this be followed by painstaking local treatment, both surgically and nonsurgically, if indicated.

Payne enthusiastically reports successful results in the treatment of true hay-fever by the local injection of the sphenopalatine ganglion with alcohol. He thinks this method should be confined to the treatment of patients in whom "the nerve lesion" is anterior to instead of posterior to the ganglion. Gundrum, in harmony with this, reports an interesting case of relief not only of chronic asthma but of an associated chronic eczema by injection of the sphenopalatine ganglion with alcohol and phenol (carbolic acid). He obtained temporary relief before operation through cocainization of the ganglion. These experiences harmonize with those previously described by others, in which such symptoms as herpes zoster and neuralgia in the ophthalmic region were relieved by similar treatment of the ganglion.

The foregoing views differ radically from those of Piness who, after a study of 834 consecutive cases of allergy, found a history of 704 unsuccessful nasal operations, Kahn, after a study of ninety-four consecutive cases of bronchial asthma in which the effect of nose and throat operations was studied in thirty-three, likewise states that improvement was temporary only, even in cases in which perfect relief of obstruction was obtained. He believes that the nose and throat should be left alone in asthma unless a local nasal condition on its own merits demands attention.

It seems to me one must admit, in justice to the foregoing opinions and to those of others, that in nasal and bronchial allergy two conditions frequently occur, namely, a condition of hypersensitiveness, which is general, combined with local pathologic changes in the nose. If local pathologic changes can be attributed primarily to the condition of hypersensitiveness or rather to local allergic reactions, it seems to me that local surgical procedures promise little for permanent relief, for they do not remove the source of the trouble. There are also two phases to the question of surgery even of organic lesions in allergic patients which cannot be attributed to allergy itself, such lesions as spurs, for example, or poor drainage or poor aeration of the nasal membranes. From one point of view, the patient should do better if local pathologic changes are corrected. From another, however, it must be admitted that the allergic subject does not always react toward surgical interference as a normal person does. Healing and recovery of the membranes traumatized by operation in an allergic subject is not always the same as it is in a normal

person, especially during periods in which reaction is taking place. Consequently, an operation which would be of benefit in a normal patient might give little relief or do actual harm in the allergic patient. Nasal operation does not necessarily seem contraindicated in a case of nasal or bronchial allergy. However, in these patients the condition has to be approached with much more care than in patients who are not of allergic strain and who have a normal nasorespiratory mucous membrane.

BIBLIOGRAPHY

Adams, J.: Asthma, Its Causation and Treatment, Am. Med. **31**:319, 1925.

Alden, A. M.: A Consideration of What May be Accomplished Through the Nasal (Sphenopalatine, Meckel's) Ganglion in the Diagnosis and Treatment of Certain Nasal Conditions, J. Ophth., Otol. & Laryngol. **29**:310, 1925.

Alexander, H. L.; Becke, W. G., and Holmes, J. A.: Reactions of Sensitized Guinea-Pigs to Inhaled Antigens, J. Immunol. **11**:175, 1926.

Amatsu, H., and Kubota, S.: Ueber die pharmakologischen Wirkungen des Ephedrins und Mydriatins, Kyoto Igaku Zasshi, **10**:301, 1913; **14**:77, 1917. (Second reference abstracted in Chem. Abstr. **12**:2019 [Oct. 10] 1918).

Baage, Kaj: The Pathogenesis of Anaphylactic Asthma, Acta Pædiat. **3**:369, 1924.

Bernton, H. S.: The Significance of Multiple Cutaneous Reactions Observed in Hay-Fever Subjects, Ann. Clin. Med. **4**:231 (Sept.) 1925.

Blumenfield, F.: Ueber allergische Realstivität der Nasenschleimhaut, Ztschr. f. Laryngol., Rhinol. **12**:363, 1923-1924.

Boyle, E. M.: Anaphylaxis, in Its Relation to Hay-Fever and Asthma, J. Nat. M. A. Newark, N. J. **17**:13, 1925.

Brown, Grafton Tyler: The Co-Seasonal Treatment of Fall Hay-Fever, Ann. Clin. Med. **3**:494 (Jan.) 1925.

Brown, G. T., and Hunter, O. B.: Calcium Deficiency in Asthma, Hay-Fever and Allied Conditions, Ann. Clin. Med. **4**:299 (Oct.) 1925.

Brown, W. L.: Discussion on the Treatment of Asthma, Brit. M. J. **2**:367 (Aug. 29) 1925.

Brumm, S. A.: More Fundamental Causes of Hay-Fever and Asthma, Atlantic M. J. **28**:637 (July) 1925.

Byrd, H.: Meckel's Ganglion and Asthma, Eye, Ear, Nose & Throat Month. **2**:628, 1923-1924.

Cadham, F. T.: Asthma Due to Grain Rusts, J. A. M. A. **83**:27 (July 5) 1924.

Calhoun, J. C.: Bronchial Asthma and the Nasal Passages, Canad. Pract. & Rev. **48**:299, 1923.

Caulfeild, A. H. W.: Skin Tests on Hay-Fever Cases with (Chemically) Different Fractions from Ragweed Pollen, Proc. Soc. Exper. Biol. & Med. **23**:38, 1925.

Desensitization in Hay-Fever Patients, Ann. Clin. Med. **2**:348 (March) 1924.

Caulfeild, A. H. W.; Cohen, Cecile, and Eadie, George S.: The Antigenic Properties of Pollen Fractions, J. Immunol. **12**:153 (Aug.) 1926.

Chen, K. K.: The Acute Toxicity of Ephedrine, Proc. Soc. Exper. Biol. & Med. **22**:204, 1925; The Effect of Repeated Administration of Ephedrine, ibid, p. 568; The Effect of Ephedrine on Digestive Secretions, ibid, p. 570.

Chen, K. K., and Schmidt, C. F.: The Action of Ephedrine, An Alkaloid from Ma Huang, Proc. Soc. Exper. Biol. & Med. **21**:351, 1924.

The Action and Clinical Use of Ephedrine, J. A. M. A. **87**:836 (Sept. 11) 1926.

Clock, Ralph Oakley; Treatment of Rhus Dermatitis with Poison Ivy Extract, J. M. Soc. New Jersey **22**:344 (Sept.) 1925.

Coca, A. F.: Zur Frage der Identität der anaphylaktischen und der atopischen Ueberempfindlichkeit, Med. Klin. **21**:57 (Jan. 11) 1925.

Relation of Atopic Hypersensitiveness (Hay-Fever, Asthma) to Anaphylaxis, Arch. Path. **1**:96-118 (Jan.) 1926.

Dennis, F. L.: Accessory Nasal Sinus Infection with Complications, Analysis of Cases Associated with Asthma and Nontuberculous Chest Lesions, Ann. Otol., Rhinol. & Laryng. **33**:451 (June) 1924.

De River, J. P.: Bronchoscopic Treatment of Bronchial Asthma and Chronic Bronchitis with Case Reports, M. J. & Record **123**:180 (Feb. 3) 1926.

Dowling, J. T.: Rhinologic Phases of Asthma, Am. Med. **31**:337, 1925.

Duke, W. W.: Physical Allergy as a Cause of Dermatoses, Arch. Dermat. & Syph. **13**:176 (Feb.) 1926.

Present Status of Our Knowledge of Allergy in Its Relationship to Otolaryngology, Arch. Otolaryng. **2**:460 (Nov.) 1925.

Allergy — Asthma, Hay-Fever, Urticaria and Allied Manifestations of Reaction, ed. 2, St. Louis, C. V. Mosby Company, 1926.

Durham, O. C.: Typical Fall Surveys of Hay-Fever Flora, J. Lab. & Clin. Med. **10**:610 (May) 1925.

Eggston, A. A.: Allergic Reactions of the Upper Respiratory Tract, J. A. M. A. **83**:1221 (Oct. 18) 1924.

Eichenlaub, F. J.: Etiology of Urticaria and Allied Dermatoses, Ann. Clin. Med. **4**:170 (Aug.) 1925.

Fetterolf, G., and Sponsler, M. B.: Ephedrin Sulphate, The Alkaloid of Ma Huang, Effects of Local Applications on the Nasal Mucous Membrane: Preliminary Report, Arch. Otolaryng. **2**:132 (Aug.) 1925.

Fineman, A. H.: Studies in Hypersensitiveness: XXIII. A Comparative Study of the Intradermal, Scratch, and Conjunctival Tests in Determining the Degree of Pollen Sensitivity, J. Immunol. **11**:465, 1926.

Frugoni, C.: Ueber den Gegenwartigen Stand der Frage des anaphylaktischen Asthma Bronchiale, Beitr. z. Klin. d. Tuberk. **61**:2, 1925.

Dell' asma anafilattico, Riforma med. **41**:409 (May 4) 1925.

Frugoni, C., and Ancona, G.: Ulteriori studi sull'asma bronchiale, Policlinico (sez. med.) **32**:161 (April) 1925.

Furth, J.: On Anaphylaxis with Heated Serum, J. Immunol. **11**:215, 1926.

Gautier, G.: Obstructions, nasales et nevroses respiratoires leur traitement par la dilatation naso pharyngienne, Presse méd. **32**:139 (Feb. 13) 1924.

Gay, Leslie N.: The Effect of Heat and Hydrogen Ion Concentrations on the Extract of Short Ragweed, J. Immunol. **11**:371, 1926.

Glaser, R. W.: Acquired Immunity in Silkworms, J. Immunol. **10**:651 (July) 1925.

Goodner, Kenneth: Studies in Anaphylaxis: IV. Allergic Manifestations in Frogs, J. Immunol. **11**:335, 1926.

Gottlieb, Mark J.: The Rôle of Bacteria in the Production of Asthma and Other Allergy, Laryngoscope **34**:363 (May) 1924.

Relation of Intranasal Disease in the Production of Bronchial Asthma, J. A. M. A. **85**:105 (July 11) 1925.

Gundrum, L. K.: Asthma and Eczema Controlled Through Nasal (Sphenopalatine) Ganglion, Ann. Clin. Med. **4**:572, 1926.

Habicher, H.: Surgery in the Treatment of Bronchial Asthma, Am. Med. **31**:366, 1925.

Hanzlik, P. J.: Blood and Tissue Changes in Anaphylactoid Reactions, California & West. Med. **23**:161 (Feb.) 1925.

Haseltine, B.: Bronchial Asthma, Am. Med. **31**:328, 1925.

A New Conception and Successful Treatment of Bronchial Asthma, M. Times **52**:49, 1924.

Rhinological Phases of Asthma, Laryngoscope **35**:629 (Aug.) 1925.

The Relationship of Asthma to Hay-Fever, Clin. Med. **32**:77 (Feb.) 1925; The Rhinological Phases of Asthma, ibid. **32**:151 (March) 1925.

Heatly, C. A., and Crowe, S. J.: Asthma and Infections of the Accessory Nasal Sinuses. A Study Based on Sixty-Two Cases, Bull. Johns Hopkins Hosp. **34**:410 (Dec.) 1923.

Hettwer, J. P., and Kriz, R. A.: Absorption of Undigested Protein from the Alimentary Tract as Determined by the Direct Anaphylaxis Test, Am. J. Physiol. **73**:539 (Aug.) 1925.

Huber, Harry L.: The Specificity of Pollens, Proc. Inst. Med. **5**:310, 1925. Hay-Fever in the Chicago Territory, Illinois M. J. **49**:133 (Feb.) 1926.

Huber, Harry L., and Koessler, Karl K.: The Antigenic Property of Pollens, Arch. Int. Med. **36**:751 (Dec.) 1925.

Jenkins, J. L.: Asthma and Sinus Disease in Children, Texas State J. Med. **21**:350 (Oct.) 1925.

Jones-Phillipson, C. E.: Nasal Factor in Causation of Asthma, S. African M. Rec. **23**:276 (July 11) 1925.

Kahn, I. S.: Asthma Problem As It Affects the South, South M. J. **19**:183 (March) 1926.

Bronchial Asthma Due to Hackberry (Celtis) Pollen, J. A. M. A. **86**:346 (Jan. 30) 1926.

Diagnosis and Treatment of Pollen Hay-Fever and Asthma, Texas State J. Med. **21**:375 (Oct.) 1925.

Kahn, I. S., and Grothaus, Emma M.: The Fallibility of the Intradermal Tests with the Grasses in Chronic Perennial Bronchial Asthma. Hypodermic Tests, M. J. & Rec. **123**:290 (March 3) 1926.

Studies in Pollen Sensitiveness, M. J. & Rec. **121**:664 (June 3) 1925.

Kahn, M. H.: Nasal Operations in Bronchial Asthma, J. A. M. A. **82**:536 (Feb. 16) 1924.

Kaiden, M. H.: Nasal Obstruction as a Factor in Hay-Fever and Allied Conditions, Laryngoscope **34**:204 (March) 1924.

Kappis, M.: Die Frage der operativen Behandlung des Asthma Bronchiale, Med. Klin. **20**:1347 (Sept. 28) 1924.

Keller, P.: Relations Between Asthma and Eczema; Report on Twenty-One Cases, Arch. f. Dermat. u. Syph. **148**:82, 1924.

Koessler, Karl K., and Durham, O. C.: A System for an Intensive Pollen Survey, with a Report of Results in Chicago, J. A. M. A. **86**:1204 (April 17) 1926.

Kubota, S.: Ephedrine, Adrenalin and Mydriation (Cf. Allocain S.) on the Pharmacological Action of Allocains (A New Local Anesthetic), J. Pharm. & Exper. Therap. **12**:361 (Feb.) 1919.

Kümmell, Herman: Die operative Heilung des Asthma Bronchiale, Klin. Wchnschr. **2**:1825 (Oct. 1) 1923.

Leopold, S. S., and Leopold, C. S.: Bronchial Asthma and Allied Allergic Disorders: Preliminary Report of a Study Under Controlled Conditions of Environment, Temperature and Humidity, J. A. M. A. **84**:731 (March 7) 1925.

Leveriza, J. C.: Anti-Allergic Treatment of Bronchial Asthma, J. Philippine Islands M. A. **5**:161 (June) 1925.

Levine, Philip: Studies in Specific Hypersensitiveness: XIX. The Relation of the Inheritance of Atopic Hypersensitiveness and the Isoagglutination Elements (Blood Groups), J. Immunol. **11**:283, 1926.

Levine, Philip; and Coca, Arthur F.: Studies in Hypersensitiveness: XX. A Quantitative Study of the Interaction of Atopic Reagin and Atopen, ibid., **11**:411, 1926.

Studies in Hypersensitiveness: XXI. A Quantitative Study of the Atopic Reagin of Hay-Fever. The Relation of Skin Sensitivity to Reagin Content of Serum, ibid., **11**:435, 1926.

Studies in Hypersensitiveness: XXII. On the Nature of the Alleviating Effect of the Specific Treatment of Atopic Conditions, ibid., **11**:449, 1926.

Lintz, W.: A Study of Three Hundred Cases of Asthma and Other Forms of Allergy, Ann. Clin. Med. **3**:653 (April) 1925.

Appendicitis in 300 Cases of Asthma and Other Forms of Allergy, New York State J. Med. **25**:368 (March) 1925.

Lack of Operative Indications in Asthma and Other Forms of Allergy, Ann. Surg. **79**:917 (June) 1924.

"Intranasal Disease in the Production of Bronchial Asthma," J. A. M. A. **85**:378 (Aug. 1) 1925.

Longcope, W. T.; O'Brien, D. P., and Perlzweig, W. A.: The Antigenic Properties of Extracts of Horse Dander: I. Active Sensitization of Guinea-Pigs to Horse Dander Extract, J. Immunol. **10**:599 (May) 1925.

The Antigenic Properties of Extracts of Horse Dander: II. The Isolation of Two Antigenic Proteins from Extracts of Horse Dander, ibid., **11**:253, 1926.

Manwaring, W. H.: Hosepian, V. M.; Enright, J. R., and Porter, Dorothy F.: Hepatic Reactions in Anaphylaxis: IX. Effects of Dehepatization on the Reactions of Certain Smooth Muscles Structures in Canine Anaphylaxis, J. Immunol. **10**:567 (May) 1925.

Manwaring, W. H.; Hosepian, V. M.; O'Neill, F. I., and Bing, Moy H.: Hepatic Reactions in Anaphylaxis: X. The Hepatic Anaphylatoxin, J. Immunol. **10**:575 (May) 1925.

McIntire, R. T.: Pulmonary Symptoms Incident to Infection of the Accessory Sinuses of the Nose, U. S. Nav. M. Bull. **18**:688 (June) 1923.

Miller, T. G.: A Consideration of the Clinical Value of Ephedrin, Am. J. M. Sc. **170**:157 (Aug.) 1925.

Moore, T. W.: Observations on Asthma by a Rhinologist, South M. J. **19**:226 (March) 1926.

Moore, W. F.: Ciliary Inhibition or Destruction in Tracheobronchial Asthma, with Notes on Bronchoscopic Treatment, Am. J. M. Sc. **169**:799-806 (June) 1925.

Nakazawa, F.: The Response of the Vasomotor Center in the Anaphylactic Shock and the Local Anaphylactic Reaction of the Peripheral Blood Vessels and the Autonomic and Motor Nerves, Tohoku J. Exper. Med. **5**:528 (March) 1925.

O'Brien, D. P.: The Antigenic Properties of Extracts of Horse Dander: III. Skin Reactions and Passive Transfer of Horse Dander Sensitiveness to the Antigens of Horse Dander Extract, J. Immunol. **11**:271, 1926.

O'Neill, F. I.; Manwaring, W. H., and Bing, Moy H.: Hepatic Reactions in Anaphylaxis: XI. Glycogen Content of the Anaphylactic Liver, J. Immunol. **10**:583 (May) 1925.

Parker, Julia T.: The Production of Precipitins for Ragweed Pollen, J. Immunol. **9**:515 (Nov.) 1924.

Payne, R. J.: Treatment of Nasal (Sphenopalatine-Meckel's) Ganglion in Hay-Fever, J. Arkansas M. Soc. **21**:257 (May) 1925.

Peiser, H.: Asthmatic Personality and Nasalogic Position of Bronchial Asthma, Med. Klin. **21**:738 (May 15) 1925; ibid., 778 (May 22) 1925.

Peshkin, M. Murray: Asthma in Children, Am. J. Dis. Child. **31**:763 (June) 1926.

Phillips, E. W.: Relief of Hay-Fever by Intradermal Injection of Pollen Extract, J. A. M. A. **86**:182 (Jan. 16) 1926.

Piness, George: Hay-Fever, J. A. M. A. **84**:584 (Feb. 21) 1925.

Piness, G., and Miller, H.: Allergy and Its Relation to the Otolaryngologist, California & West. Med. **23**:1014 (Aug.) 1925.

Allergy: Nonsurgical Disease of Nose and Throat, J. A. M. A. **85**:339 (Aug. 1) 1925.

Allergic Manifestations in Infancy and Childhood, Arch. Pediat. **42**:557 (Sept.) 1925.

Posey, E. L.: Treatment of Certain Forms of Asthma by Removing Obstructions of the Upper Respiratory Tract, South M. J. **17**:535 (July) 1924.

Prausnitz and Küstner: Centralbl. f. Bakteriol. Orig. **86**:160, 1921.

Rackemann, F. M.: Can Hypersensitiveness Be Acquired? J. A. M. A. **84**:489 (Feb. 14) 1925.

Fatal Asthma. Report of a Case with Autopsy, Boston M. & S. J. **194**:531 (March 25) 1926.

The Results of the Specific Treatment of Late Hay-Fever: The Optimal Dosage in the Treatment of Hay-Fever, J. Immunol. **11**:81, 1926.

Ramirez, Maximilian A.: The Management of Asthma, Laryngoscope **35**:330 (April) 1925.

Ramirez, Maximilian A., and Cole, Lewis G.: Roentgen-Ray Therapy in Bronchial Asthma, Am. J. Roentgenol. **14**:322 (Oct.) 1925.

Ramirez, Maximilian A., and Pool, Eugene H.: Sympathectomy in Bronchial Asthma, J. A. M. A. **84**:2002 (June 27) 1925.

Rendu, R.: Asthma datent de onzeans gueri par curethaje ethmoidal, Lyon méd. **134**:285, 1924.

Rott, O. M.: Etiologic Relationship Between Certain Nasal Affections and Bronchial Asthma, Northwest Med. **23**:185 (April) 1924.

Rowe, A. H.: Treatment of Bronchial Asthma, J. A. M. A. **84**:1902 (June 20) 1925.

Bronchial Asthma in Children and Young Infants, Am. J. Dis. Child. **31**:51 (Jan.) 1926.

Rowe, A. H., and Rogers, H.: Allergic Dermatitis: Report of Case Due to Mohair, California & West. Med. **23**:1589 (Dec.) 1925.

Rowley, J. C.: Personal Experiences with the Modern Treatment of Hay-Fever and Asthma, M. Progress **41**:232, 1925.

Scheppegrell, W.: Prevention and Treatment of Hay Fever, N. Albany Herald **33**:201, 1924; Cincin. J. Med. **5**:306, 1924-1925; Pub. Health Rep. **39**:1491 (June) 1924; West. M. Rev. Omaha **29**:378, 1924.

Comfort for Hay Fever Subjects at Home, M. J. & Rec. **120**:4 (July 2) 1924.

Hay Fever Pollens in Upper Air, M. J. & Rec. **121**:660 (June 3) 1925.

Hay Fever from Tree Pollens, New Orleans M. & S. J. **78**:132 (Sept.) 1925.

Permanency of Hay Fever Cures, M. J. & Rec. **122**:643 (Dec. 2) 1925.

Schmidt, C. F., and Chen, K. K.: The Action of Ephedrine, the Active Principle of the Chinese Drug Ma Huang, J. Pharm. & Exper. Therap. **24**:339 (Dec.) 1924.

Schmidt, R.: Constitutional Asthma, Med. Klin. **22**:46 (Jan. 8) 1926; abstr. J. A. M. A. **86**:727 (March 6) 1926.

Sherwood, Noble P.: Use of Skin Tests in Medicine, J. Kansas M. Soc. **25**:249 (Aug.) 1925.

Sherwood, Noble P., and Stoland, O. O.: Anaphylaxis: III. Further Studies on Bacterial Anaphylaxis, J. Immunol. **10**:643 (July) 1925.

Sluder, G.: Relief of Asthma in Presence of Chronic Bronchitis with Emphysema Through Nasal (Sphenopalatine) Ganglion, Ann. Clin. Med. **3**:718 (May) 1925.

Solis-Cohen, M., and Rubenstone, A. I.: Bacteriological Study of Upper Respiratory Tract in Asthmatics, with Special Reference to Selective Pathogenicity, Ann. Clin. Med. **4**:574 (Jan.) 1926.

Spain, W. C., and Cooke, Robert, A.: Studies in Specific Hypersensitiveness: XI. The Familial Occurrence of Hay-Fever and Bronchial Asthma, J. Immunol. **9**:521 (Nov.) 1924.

Spivacke, C. A.: Asthma with Pneumothorax, M. J. & Rec. **122**:10 (July 1) 1925.

Treatment of Hay Fever, ibid., **122**:223 (Aug.) 1925.

Spivacke, C. A., and Grove, Ella F.: Studies in Hypersensitiveness: Study of the House Dust Atopen in Asthma, J. Immunol. **10**:465 (March) 1925.

Thomas, William S.: Ephedrin in Asthma, Am. J. M. Sc. **171**:719, 1926.

Tod, M. C.: The Results of Operations on the Nose and Throat in Cases of Asthma, J. Laryngol. & Otol. **40**:582 (Sept.) 1925.

Touart, M. De M., and Thomas, W. S.: Autogenous Vaccines in Diagnosis, with Special Reference to Asthma: Preliminary Report, Arch. Int. Med. **34**:85 (July) 1924.

Varekamp, H.: Experimentelle allergische Krankheiten (Asthma Bronchiale, Rhinitis Vasomotoria), Ztschr. f. Immunitätsforsch. u. exper. Therap. **40**: 552, 1924.

Walzer, Matthew: A Direct Method of Demonstrating the Absorption of Incompletely Digested Proteins in Normal Human Beings, J. Immunol. **11**:249, 1926.

Zinsser, Hans; and Grinnell, Francis B.: Further Studies on Bacterial Allergy. Allergic Reactions to the Hemolytic Streptococcus, J. Imunol. **10**:725 (July) 1925.

Zinsser, Hans; Ward, Hugh K., and Jennings, Frederick B., Jr.: The Significance of Bacterial Allergy as a Sign of Resistance, ibid., p. 719.

Zinsser, H., and Mueller, J. H.: Nature of Bacterial Allergies, J. Exper. Med. **41**:159 (Jan.) 1925.

Waring, James J.: A Hay Fever Plant Survey of the City and County of Denver, Colorado Med. **22**:194 (June) 1925.

Wise, F., and Ramirez, M. A.: Protein Sensitization in Pruritus with Lichenification, Arch. Dermat. & Syph. **2**:751 (June) 1925.

Witzel, O.: Die Sympathicusoperation inn Ring der Heilmassnahrnen beim Asthma Bronchiale, Klin. Wchnschr. **4**:448 (March 5) 1925.

Wodehouse, R. P.: Morphology of Pollen Grains in Relation to Plant Classification, J. New York Botanical Garden **27**:145-154, 1926.

News and Comment

NATIONAL SOCIETY MEETINGS

The American Ophthalmological Society will hold its next annual session in Quebec, Canada, June 27-29, 1927. President, Dr. William Zentmayer, 1506 Spruce St., Philadelphia; secretary, Dr. Emory Hill, professional Bldg., Richmond, Va.

The American Academy of Opthalmology and Oto-Laryngology will hold its next annual session in Detroit, September 12-16, 1927. President, Dr. Edward C. Ellett, Exchange Bldg., Memphis, Tenn; secretary, Dr. L. C. Peter, 1529 Spruce St., Philadelphia.

LOCAL SOCIETY MEETINGS

COLORADO: The Colorado Oto-Laryngological Society meets on the first Saturday of the month from October to May, at the Assembly Room of the Metropolitan Building. President, Dr. David A. Strickler; secretary, Dr. C. Howard Darrow, Metropolitan Building, Denver.

ILLINOIS: The Chicago Laryngological and Otological Society meets at 6 p. m. on the first Monday of the month from October to May, in the Grill Room, Stevens Restaurant, 16 N. Wabash Ave. President, Dr. Arthur M. Corwin; secretary, Dr. Austin A. Hayden, 25 E. Washington St.

MARYLAND: The Section on Otology and Laryngology of the Baltimore City Medical Society meets at 8:30 p. m. on the last Friday of each month, at 1211 Cathedral St. Chairman, Dr. Edward A. Looper; secretary, Dr. Edwin N. Broyles, 1100 N. Charles St.

MISSOURI: The Kansas City Eye, Ear and Nose Society meets the third Thursday of each month from September to May. The November, January and March meetings are devoted to clinical work. President, Dr. Joseph W. Kimberlin; secretary, Dr. A. E. Eubank, 636 Argyle Bldg.

NEW YORK: The Section on Laryngology and Rhinology of the New York Academy of Medicine meets at 8:30 p. m. on the fourth Wednesday of the month from October to May, at 17 W. 43d Street. Chairman, Dr. John E. Welch; secretary, Dr. Arthur Nilsen, 40 E. 41st St.

The Otological Section of New York Academy of Medicine meets on the second Friday of each month from October to May, at 103d St. and Fifth Ave. Chairman, Dr. J. L. Maybaum; secretary, Dr. R. T. Atkins, 4 W. 53d St.

OHIO: The Ophthalmological and Otolaryngological Section of the Cleveland Academy of Medicine meets on the fourth Friday of each month at the Winton Hotel. Chairman, Dr. E. W. Garrett; secretary, Dr. M. Paul Motto, Rose Building.

PENNSYLVANIA: The Section on Otology and Laryngology of the College of Physicians of Philadelphia meets at 8:30 p. m. on the third Wednesday of each month from October to June, at the College of Physicians. Chairman, Dr. Fielding O. Lewis; clerk, Dr. James A. Babbitt, 1912 Spruce St.

WISCONSIN: The Milwaukee Oto-Ophthalmic Society meets at 6:30 p. m. on the third Tuesday of the month, at the University Club. President, Dr. Charles J. Coffey; secretary-treasurer, Dr. Edward R. Ryan, 425 E. Water St.

Abstracts from Current Literature

Ear

THE RESULT OF IONIC MEDICATION IN CHRONIC MIDDLE EAR SUPPURATION. NORA LISTER, J. Laryng. & Otol. **41**:94 (Feb.) 1926.

It was decided to follow-up those patients with chronic suppuration in the middle ear who were treated by zinc ionization at the Royal Infirmary, Edinburgh. Most of these patients had been treated previously by the ordinary syringing and administration of spirit drops.

The method of zinc ionization was, first, to syringe the ear with compound solution of cresol and then with zinc sulphate. The patient was placed on the side, with the ear to be treated on the upper side, and the canal was then filled with zinc solution. The zinc electrode was fixed to a vulcanite speculum and was attached to the positive pole of the battery. The negative pole was applied to the forearm over a thick pad of lint soaked in warm saline solution. A current of from 2 to 4 milliamperes was used for from ten to fifteen minutes (longer in the postoperative cases). This treatment was carried out weekly four or five times, spirit drops being used daily during that time without syringing. The treatment was not used on children under 5 years of age.

Of thirty-eight patients treated, in thirteen the ears were found to be dry; in three, the ears were stated to be dry; in five, the ears were improved and in three the improvement was only temporary. Twenty patients showed no improvement. The cases are classified as to causation, the site of the perforation, the presence of granulations and as to whether a radical mastoid operation had been performed. The best results were obtained in the patients in whom the cause was other than scarlet fever, diphtheria or measles, when the perforation was posteromarginal, and when there were no granulations present. In this series, 25 per cent were cured and 11.8 per cent were improved.

THE PROGNOSIS OF MIDDLE EAR SUPPURATION IN CHILDREN: A REVIEW OF FIVE HUNDRED CASES. DOUGLASS GUTHRIE, J. Laryng. & Otol. **41**:305 (May) 1926.

Otitis media is often responsible for much ill health, and may cause many secondary infections, such as gastro-enteritis and pneumonia, from infective material escaping through the eustachian tube. Otitis media is most common during the first two years of life, and more common in children several months old than in young infants. The author believes that the ordinary cold is responsible for more cases of otitis media than are the exanthems. It is pointed out that in latent otitis media the otoscopic observations may not be definite, so that a diagnosis must be made on the general condition. An exploratory paracentesis is advised.

When there is acute suppuration in the mastoid and the simple mastoid operation has been performed, the wound should be packed with bismuth subnitrate, iodoform and paraffin and closed. The results are uniformly good.

The causes of chronicity are chiefly neglect of treatment and recurring colds in the head. After any operative interference, the patient should be followed for years.

There is a report made of the results of following up 500 cases from the Royal Hospital for Sick Children for the years 1920 to 1924. Of the patients with acute suppurative otitis media treated conservatively, 78 per cent were

cured, whereas 75 per cent of the patients with acute mastoiditis with operation were also cured, i. e., there was no discharge or deafness. Therefore, the prognosis with mastoiditis when properly treated is as favorable, except that there were eight deaths from meningitis and sinus thrombosis in the series of patients with mastoiditis. In chronic suppurative otitis media, 57 per cent were cured by conservative treatment. In the patients in whom an operation was performed, 25 per cent of those who had the radical operation were cured, but when the simple mastoid operation was performed, 75 per cent were cured; so that in children it is obvious that the simple operation should first be attempted, unless there is marked destruction of the middle ear structures.

There were twenty-two cases of tuberculous otitis media, in all of which the diagnosis was confirmed microscopically. The radical operation was performed on every patient. In only one patient was there a complete cure.

In conclusion, the author suggests that more care should be given to protecting children from the common cold. More care should be given to nasal hygiene, especially in teaching children the proper method of blowing the nose. Infection of the teeth and tonsils should be dealt with, and patients with recurrent otitis media should be kept constantly under attention.

ZINC IONIZATION IN TYMPANIC SEPSIS. T. B. JOBSON, J. Laryng. & Otol. **41**:383 (June) 1926.

Regarding the report of the Edinburgh School (*J. Laryng. & Otol.* **41**:94, 1926), the author wishes to point out that Leduc and Friel established certain principles for zinc ionization which must be considered before an opinion can be formed on the results of zinc ionization.

It is most important that the zinc ions come in contact with the organisms. Therefore, the treatment should be attempted only in selected cases. When the perforation is small, or is blocked by granulations, or when the disease is in the mastoid, it is impossible to hope that zinc solution in the canal will reach the organisms at the distant site of disease in the tympanum. The most suitable patients are those with the large free perforations. The canal and the middle ear should be cleared of all débris first by mopping out, then by using Siegle's speculum for suction, finally by irrigation with zinc chloride. Then 10 minims of cocaine plus epinephrine is instilled into the tympanum to shrink the mucosa. Finally the tympanum is filled with zinc solution by using an attic cannula if necessary. In this way it is possible that the solution and ions may come in contact with the diseased tympanum.

The failures are due to unsuitable cases being chosen, or to the sepsis being inaccessible, or to the fact that due care is not given to the technic. In a series of cases reported in 1922, the author had 60 per cent of cures.

Postoperative discharge is usually due to carious bone or to a diseased cell, and these are most often inaccessible to the zinc, so that in most of these cases the patients are not helped by ionization.

Electric ionization, therefore, to be effective must be applied by a skilled aurist, and the primary question of suitability can be decided only by an aurist.

THE INFLUENCE OF BLOOD PRESSURE ALTERATIONS ON EXPERIMENTAL VESTIBULAR NYSTAGMUS. YRJO MEURMAN, J. Laryng. & Otol. **41**:421 (July) 1926.

The author's object was to observe the effect of blood pressure changes on nystagmus. To produce alterations in blood pressure, many drugs have been used by as many experimenters. The results were variable, and their methods of experimenting were involved. In this series the rabbit is used under ether

anesthesia or as a "thalamus preparation." The external and internal rectus muscles are dissected free from the eyeball, which is then removed; the muscles are then attached to a double armed Keith Lucas recording apparatus. The blood pressure is taken from one carotid and measured by a mercury manometer and recorded on the kymogram between the two levers of the Keith Lucas recorder.

A rise of 70 mm. of mercury caused by epinephrine produced no effect on the caloric, spontaneous labyrinthine, or centrally induced nystagmus. Pituitary extract, which causes a considerable rise of blood pressure, effects a tonic contraction in both muscles, and diminishes the extent of the nystagmic contraction. Using lobelin, there was no effect observed on the nystagmus.

Of the drugs that cause a fall of blood pressure, cholin does not effect nystagmus. Amyl nitrite caused no change in the caloric or spontaneous labyrinthine nystagmus. However, in some experiments there was some slight change. Calcium chloride had no effect on the nystagmus. Compression of the abdominal aorta, which causes a considerable fall of blood pressure, has no effect on the nystagmus.

These results are compared with the results obtained by other experimenters using other drugs. Nicotine causes a fall of blood pressure, and the eye is deviated to the side of the primarily contracted muscle (direction of the quick phase). With atropine the eye deviates to the side of the primarily contracted muscle. With sodium chloride, the deviation is to the side of the primarily contracted muscle.

As a control, the drugs in this series of experiments were injected into a "thalamus rabbit," to show that they do not produce a spontaneous nystagmus of themselves. There was no definite change of any eye movement that was present before the injection.

The author concludes that raising or lowering of the blood pressure in the carotid of the rabbit, within certain limits, does not effect labyrinthine or centrally produced (Bechterew) nystagmus. His conclusion applies only to the drugs here used and in the same doses.

McNALLY, Montreal.

SUCCESSFUL TREATMENT OF CHRONIC DISCHARGING EARS AND ALLIED CONDITIONS BY MEANS OF ZINC IONIZATION. JOHN MCCOY, Laryngoscope **36**:434, 1926.

The use of zinc ionization in the treatment of chronic suppurative otitis media has proved successful in a considerable number of cases. Its limitations, however, are well defined. McCoy states that when there exists a marginal perforation in Shrapnell's membrane with bone necrosis and foul smelling pus, this method should not be used. He has found it exceedingly useful in cases of subacute and chronic discharge in which the perforation is central or near the margin, and when numerous other methods used for chronic suppuration have failed. Extension of infection to adjacent structures should be ruled out before resorting to its use.

Ionization is a chemical decomposition effected by means of an electric current. Ions result from the electrolytic decomposition of a molecule, and are either electronegative or electropositive, the former being called anions and the latter cathions. The electropositive, or cathions, tend to flow toward the negative pole. It has been found that by the use of a solution of sulphate of zinc at the positive pole and the ordinary saline solution at the negative pole, it is possible to drive the zinc ions into the exudate and into the membranes of the ear cavities.

The technic of the treatment consists in cleansing the ear thoroughly with warm water, after which 4 per cent cocaine solution is applied to the middle ear on a cotton pledget for from five to ten minutes. The patient is then placed on a table with the diseased ear upward. After the pledget of cotton has been removed, the ear is filled with a 1 or 2 per cent zinc sulphate solution, and the zinc electrode attached to the positive pole is placed in the ear through a vulcanite speculum so that the zinc electrode and the zinc sulphate solution are in contact. The patient is then given the other pole to hold in the hand, or it is applied to the arm, being wet with a saline solution. The current is then turned on gradually until a strength of 3 milliamperes is reached. This is allowed to continue for ten minutes, when the current is gradually turned off. Slight vertigo or a slight pain in the region of the eustachian tube may occur in some instances. The author has treated eighteen patients with this method with very gratifying results, the patient's ear condition drying up in from two to six treatments in the majority of cases. The treatments were administered once every four or five days.

SNAPP, Grand Rapids, Mich.

HERPES ZOSTER OTICUS AND ALLIED CONDITIONS WITH NOTES OF THREE CASES. THOMAS GUTHRIE, Lancet **1**:710 (April) 1926.

The author credits J. Ramsay Hunt with the first comprehensive description of the syndrome now known as herpes zoster oticus. It is an inflammation of the geniculate ganglion of the facial nerve. The afferent fibers concerned are the chorda tympani and the sensory fibers incorporated in the auriculotemporal branch of the third division of the fifth nerve and of the auricular branch of the vagus. The area of skin affected by the herpetic inflammation of the geniculate ganglion is a cone-shaped area, the apex of which is the drum membrane, and the base is the auricle. If the inflammatory process spreads to the motor fibers of the facial nerve, there is a facial paralysis. The ganglions of Corti and Scarpa may also be involved, causing deafness and vertigo. Allied conditions are herpes facialis, in which the gasserian ganglion is involved, and herpes occipito-collaris from inflammation of the upper cervical ganglion. Herpes zoster oticus should be carefully diagnosed from acute otitis media and mastoiditis. The duration of the disease varies. The pain may last three weeks; the facial paralysis may last for days or weeks. In rare cases there may be some degree of permanent deafness or facial paralysis. The treatment consists of sedatives for pain, massage and electrical treatment for the paralysis, and local applications for the herpetic eruption. Detailed symptomatology of three cases is given.

MCNALLY, Montreal.

BACTERIOLOGIC VARIATIONS IN EAR CONDITIONS DUE TO DIPLOCOCCUS MUCOSUS. ERNST URBANTSCHITSCH, Monatschr. f. Ohrenh. **4**:302 (April) 1926.

Urbantschitsch finds that the organism of mucosus otitis is not a constant observation, even though it be the bacterium instigating the otitis and mastoiditis. It simulates the tubercle bacillus in that it is difficult to find in the discharge of the middle ear or in the mastoid empyema. One culture from the ear may disclose *Streptococcus mucosus*, a later one a sterile culture, and a still later one pneumococcus or *Streptococcus pyogenes*.

The question arises whether *Streptococcus mucosus* undergoes bacteriologic variations into transitional forms or into other recognized forms, or whether one does not succeed in obtaining the bacteria from the interstices of the mastoid cells where they are wont to harbor. The author inclines to the former view.

INDICATIONS FOR LABYRINTHECTOMY. RUDOLF LEIDLER, Monatschr. f. Ohrenh. **5**:393 (May) 1926.

Clear-cut cases of acute or chronic otitis media with a "dead" labyrinth and suspected intracranial complication are universally recognized as demanding an immediate labyrinthectomy. Again, complete deafness, third degree nystagmus to the opposite side, in an acute or chronic otitis when there is no reaction on calorization of the ear, is an absolute indication for labyrinthectomy, especially if the temperature is 38 C. or over and the symptoms continue for four or more days.

The author includes thirteen histories of patients to whom the foregoing rules were not always applicable because of circumstances complicating the general picture of the ear condition. He is lead, therefore, to append the following more specific indications for labyrinthectomy.

1. When a facial palsy occurs in the presence of a labyrinthitis, a radical mastoid operation should be performed, and if there are granulations attached to the labyrinth capsule, a fistula or a cholesteatoma present, labyrinthectomy is indicated, though all the labyrinthine functions may not as yet be destroyed.

2. When a mastoid heals sluggishly after operation, and the circumscribed labyrinthitis progresses so that dizziness increases and the nystagmus is more intense with a headache persisting, labyrinthectomy should be performed; the operation should not be delayed till all the labyrinthine functions disappear.

3. In acute otitis demanding a mastoid operation, if a rapid loss of labyrinthine functions ensues, the radical mastoid operation is indicated in order to explore the condition of the labyrinthine capsule.

4. The intact labyrinth may be sacrificed when in the presence of a brain abscess, particularly a cerebellar abscess or an extradural abscess of the posterior fossa, or when the anatomic relations do not permit good exposure and wide exploration of the cranial contents.

GLOWACKI, Detroit.

NYSTAGMUS AND STRABISMUS IN A CASE OF SYPHILIS OF THE VESTIBULAR APPARATUS. J. OHM, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:489 (June 12) 1926.

Ophthalmologists are indebted to otology for two valuable acquisitions besides the systematic and successful investigation of nystagmus. One is the nystagmography (Buys, 1909), and the other the "railroad nystagmus" (Bárány, 1907 and 1920). Ohm reports a case in point. Otologists (Luebbers) had diagnosed pachymeningitis syphilitica. The observations of Ohm must be read in the original. In his book, Ohm described two other cases of staring in turning. He claims that his patients show, among other phenomena, that the optical turning nystagmus can be missing on one side, although the voluntary motion of the eyes to that side is not disturbed. It can even be missing on both sides, and yet the optical paths and voluntary innervations may function. It cannot be stated whether the voluntary path and the path of the descending optical reflex enter the brain stem separately. Ohm attributes not only the vestibular but also the optical nystagmus to Dieters' nucleus. He came to this conclusion in 1915 by analytic studies. He referred the pendulum-like miners' nystagmus to the labyrinth in 1915, and later to the vestibular nucleus. Bartels referred the quick component to the cerebrum and Bárány to the supranuclear visual center. Ohm was led to attribute also the quick component to the vestibular nucleus on account of the relationship between the slow and quick component,

and the change of one into the other which can be brought about by a little change in direction of vision or of illumination. Only a quantitative difference exists between pendulum and jerking nystagmus (Ruckzittern), because a pendulum-like nystagmus changes, as a rule, into jerking nystagmus if the amplitude increases. Brunner, among others, does not accept this view, and claims that pendulum nystagmus is not created by the labyrinth. It has neither been proved by experiments nor by clinical observation. The weakest irritation led only to compensatory movements of the eye and stronger ones to jerking nystagmus. Ohm suggests using nystagmography systematically in all labyrinthian diseases. Perhaps then pendulum nystagmus will be encountered. In one case which Ohm considered a disturbance of Deiters' nucleus, pendulum nystagmus of a frequency of 432 oscillatious was present (*Arch. Ophth.* **96**:3, 1918). Some authors think that the slow component may be present whereas the quick component is missing. Ohm claims that two things must be distinctly separated from each other, namely (1) the slow tonic deviation of the eyes which can occur in the direction of turning and in the opposite direction, and (2) the nystagmus which is characterized by a slow and a quick component. The real slow phase of nystagmus has always a great reverse motion. Ohm also thinks that the quick component cannot be suppressed without influencing the slow component considerably. He has collected five cases of acquired vestibulary nystagmus with peculiar strabismus and does not think of an accidental combination. It is true that the angle is small. The maximum of the deviation in height was 8 degrees and to the side 23 degrees. Convergence increased with the lowering of the visual line, which can also be observed in concomitant strabismus, in accommodation and in paralysis of the abducens. Perhaps a vestibulary influence is present.

Congenital nystagmus with strabismus is a frequent combination, also without pronounced hypermetropia. If one concedes the vestibular origin, this suggests that squinting can be referred to the same cause. The wheel turning nystagmus can only be considered a vestibular nystagmus and not an optical or cortex nystagmus. This holds good especially for cases of oblique squinting which Ohm declared, as far back as 1918, to be of a vestibulary nature. Two kinds must be differentiated. More frequently, the eye squinting inward squints also upward when looking to the other side. In rarer cases the eye, deviated inward, squints downward when looking to the opposite side, but to a small degree. If a child possessing the more frequent type is ordered to look to the right, the impression prevails that the right eye moves downward and outward, the left upward and inward. Similar influences appear to exist as they are observed in Magendie-Hertwig's strabismus position, which recently has been described as a vestibulary symptom (Poetzl and Sittig, and Mauthner). Worth and others refer squinting to a congenital defect of fusion. But what is the defect? Is it a disturbance in the eye or in the pathways or centers, or are there other possibilities, for instance, a defective connection of the visual path with Deiters' nucleus? Experience has shown that in patients who have been operated on for strabismus, the possibility of practice of fusion is restricted even if the eyes are in a good position and if the acuteness of vision is good. The vestibulary theory of strabismus is well founded. Otologists are called on to look for strabismus deviations in all vestibulary diseases by employing exact methods.

Pharynx

A New Method of Anesthesia for Opening Peritonsillar Abscess. Gordon D. Hoople, Laryngoscope **36**:577, 1926.

There are obvious reasons why surgery for the relief of peritonsillar abscess is usually performed under local anesthesia. The results obtained from a local anesthetic in such cases, however, are, at the best, rather unsatisfactory. Realizing this fact, Hoople, after a careful study of the nerve supply of this region, decided that cocainization of the sphenopalatine ganglion might help in solving the problem. The anterior, middle, and posterior palatine nerves, all being branches from this ganglion, have some of their terminal fiber in the tonsil and in the soft palate adjacent to the tonsil. Consequently, cocainization of the ganglion on one side should diminish sensation in the soft palate of the same side, and thereby aid in securing a better anesthetization in opening a peritonsillar abscess. A short series of ten cases was tried with this method. Although there was some sensation still present at incision, the author believes the observations in each case seem to justify the procedure. The ganglion was cocainized in the usual manner, with a 10 or 20 per cent solution of cocaine. After four or five minutes, several of the patients volunteered the information that they could swallow much easier and with much less pain. Other patients agreed to this on questioning. They were also able to open the mouth much wider, thus giving the surgeon a better view in making his incision.

Snapp, Grand Rapids, Mich.

The Treatment of Chronic Tonsillitis: I. Choice of Methods in Chronic Tonsillitis. J. S. Fraser, Lancet **1**:408 (Feb.) 1926. II. Tonsillectomy in Adults and Children, ibid. **1**:454 (Feb.) 1926.

There are two types of tonsil: (*a*) the pedunculated, which is protruding or prominent, and (*b*) the embedded or the submerged tonsil, the size of which is deceptive for it may be much larger than it at first seems. The efferent lymphatics of the tonsil drain into the jugulodigastric or tonsillar gland at the angle of the jaw. The tonsil is part of the lymphatic ring which guards the entrance to the alimentary and respiratory tracts. They are most active during early life. The crypts may act as culture tubes from which toxins are absorbed to produce an active immunity. If there were an internal secretion from the tonsil, the bad effects of its removal should have become manifest.

About 6 to 10 per cent of school children have such tonsillar hypertrophy as to require enucleation. If there is infection in the crypts and below the epithelium, the condition is lacunar tonsillitis. If the infection has broken through the capsule of the tonsil, it becomes peritonsillitis and peritonsillar abscess. Trouble in the tonsil may date from one of the exanthems or, or the other hand, the tonsil may be regarded as the portal of entry for the streptococcus of scarlet fever or of rheumatic fever. The organisms found in the tonsils are many and varied. When hypertrophy is the indication for removal, tuberculosis is found in 1 per cent of the patients examined by the bacteriologist; but when there is marked enlargement of the cervical lymph glands, the tubercle is found in the tonsil in 38 per cent of the cases (Carmichael). In tuberculous cervical adenitis, 88 per cent of the cases are due to infection spreading from the tonsil, the tonsil often being normal in appearance.

A complete list is given of the indications for tonsillectomy. They may be summarized as follows: Infection, hypertrophy, enlargement of the cervical lymph glands and association with disease in other parts of the body in which there is definite evidence that the tonsils themselves are diseased. The contra-indications to operation are elevation of temperature, hemophilia, acidosis and general debility.

For treatment there is only the conservative method of using gargles, etc., or the radical method of complete enucleation of the tonsil by operation. There is a detailed description given of the guillotine and of the dissection method of operation. The author prefers the guillotine method with general anesthesia for children, and the dissection method under local anesthesia for adults.

The opinions regarding postoperative hemorrhage are varied and unreliable. Postoperative hemorrhage results in about from 0.5 to 2 per cent of cases of tonsillectomy. As a preventive measure, calcium chloride or horse serum may be administered before the operation. For hemorrhage the author prefers such conservative methods as removing clots, applying pressure and the use of astringents, etc. Ligature of the bleeding point is mentioned, but one is cautioned concerning the difficulties encountered.

The results following tonsillectomy, when the operation was indicated, are gratifying. Subsequent colds, if any, are never so severe. The remote results are varied, depending on the nature of the condition, e. g., in chronic toxemia the results have been excellent.

McNALLY, Montreal.

Larynx

TUBERCULOSIS OF THE LARYNX: TREATMENT WITH THE GALVANOCAUTERY: INDICATIONS; RESULTS; TECHNIC. SIR ST. CLAIR THOMSON, Lancet **1**:1084 (June) 1926.

The three chief conclusions arrived at are that: (1) as a local help the galvanocautery is the most valuable remedy we possess at present; (2) the cases in which it is suitable are relatively few; (3) these cases, well selected, yield a cure in a large proportion.

No patient who has not been treated in the sanatorium for three months is ever submitted to the galvanocautery, the effect of rest on the voice having first been determined. The most promising patients are those in whom the disease is restricted to the intrinsic larynx, i. e., the vocal cords, the inter-arytenoid and the arytenoid regions. The treatment is dangerous during an acute invasion by the disease, or if there is perichondritis or pain and dysphagia. The general condition of the patient must also be studied. If there is an unsteady temperature, quick pulse, failing weight or feeble resistance, it is unwise to use the cautery.

During a period of fourteen years at Midhurst sanatorium, 17.5 per cent of the total number of patients had laryngeal tuberculosis. Of the 620 patients with laryngeal tuberculosis, 16.61 per cent were considered suitable for cautery treatment (as many patients are cured by being silent or whispering). The number of treatments average about 3.2 applications, and each application should be about one month apart. A cure resulted in 62 per cent of the cases during the first ten years of the period and in 69 per cent during the last four years. During the first ten years, a cure was secured by silence, whispering or by the galvanocautery in 25 per cent of the cases of laryngeal tuberculosis. The author prefers the indirect method of applying the galvanocautery

under local anesthesia. A fine platinum point is used at white heat at the edge of the ulcer, the object being to promote inflammatory and limiting fibrosis. Several punctures may be made at one sitting, the number depending on the size of the diseased area.

McNALLY, Montreal.

Nose

TREATMENT OF CONGESTED AND ENLARGED INFERIOR TURBINATES. F. H. B. NORRIE, J. Laryng. & Otol. **41**:87 (Feb.) 1926.

Hypertrophy of the inferior turbinate is common in workers in jute mills, and the author has had the opportunity of treating a large number of these patients. (Conditions due to accessory sinus disease are not included in this discussion.) Zinc electrolysis is the method used to reduce the swelling or enlargement of the turbinate. After inducing thorough local anesthesia in the nose, the shellac coating is removed from a zinc needle for a length just a little less than the length of turbinate to be treated. The uncovered part of the needle is then inserted into the turbinate just along the bone until the beginning of the shellacked portion of the needle has just penetrated the mucosa so that in this manner the mucosa is protected by the shellac. Care must be taken that the needle has not punctured the mucosa farther back and come to the surface. The needle is connected with the current which is slowly turned on up to 3 to 6 or to 10 milliamperes and maintained for ten minutes, when the current is slowly reduced and reversed, and then increased slowly to 5 to 6 milliamperes for five or ten minutes or until the needle has been loosened, then the current is slowly shut off. The needle is then withdrawn. If attention has been paid to details, there will have been no shock or burn, and there will be no external wound except the site of puncture, which has been protected by the shellac. After three or four weeks there is a contraction of the area allowing a free airway.

McNALLY, Montreal.

COMPLICATED EMPYEMA OF THE FRONTAL SINUS. F. NORSK, Proc. Danish Soc. Otolaryng., Hospitalstid. **69**:90, 1926.

The case reported was that of a woman, aged 24, with a history of a left-sided maxillary sinusitis for which an operation had been performed seven years previously. A fistula remained leading into the canine fossa. This had been dilated twice; the second dilatation was performed five months previously. Since this operation there had been a free drainage of pus from the fistula, but a left-sided headache persisted. On admission it was found that the roentgen ray and transilluminator indicated infection in all the paranasal sinuses on the left side. Four days after admission, the maxillary, frontal and anterior ethmoid sinuses were all opened under a general anesthetic; the Denker operation was used on the maxillary and the Killian operation on the frontal sinus. Pus and polypoid mucous membrane were found in all the sinuses. The patient did not do well. Two weeks after the operation the wound was reopened, and an area of carious bone was found about the nasofrontal suture. This was removed without causing improvement in the patient's condition. At a third operation the frontal was again cleaned out, all the ethmoids were opened and a portion of the middle concha was removed. Erysipelas developed a few days later. The general condition grew worse, and a week later a fourth operation was performed

which revealed a subdural abscess and an extensive osteomyelitis of the frontal bone. The patient died in coma. Purulent meningitis and a subdural abscess were found at necropsy.

In the discussion, Carl Jacobsen, R. Lund, T. Borries and Schmiegelow cited similar cases. Osteomyelitis and intracranial complications occur occasionally following frontal sinusitis, and are dangerous.

ANDERSON, Duluth.

Miscellaneous

NOTE ON THE CONNECTION OF BRAIN ABSCESS WITH BRONCHIECTASIS. JAMES ADAM, J. Laryng. & Otol. **41**:93 (Feb.) 1926.

Both the author and Chevalier Jackson have drawn attention to the relation between sinusitis and bronchiectasis. A known cause of death in bronchiectasis is brain abscess, and the author wishes to point out that, like bronchiectasis, the brain abscess probably also arises from the associated sinusitis and therefore for the most part should be in the frontal region. The obvious inference would seem to be that in every case of bronchiectasis, a thorough examination should be made of the sinuses. Any case of bronchiectasis that comes to necropsy should be thoroughly investigated for evidence of sinusitis.

McNALLY, Montreal.

ZINC WIRES AND NEEDLES FOR IONIZATION AND ELECTROLYSIS. F. H. B. NORRIE, J. Laryng. & Otol. **41**:599 (Sept.) 1926.

This short paper is a detailed description of the preparation of zinc wire for electrolysis. There is also an analysis of the chemical composition of the wire, with a discussion of the therapeutic value of the various constituents. Zinc is used on account of its being rapidly dissociated, for its high antiseptic value and for its power of coagulating albumins. The annealing process does not effect these qualities.

GLOSSOPHARYNGEAL NEURALGIA. GEORGE C. ALBRIGHT, Laryngoscope **36**:407, 1926.

This condition is undoubtedly rare, but its existence as a clinical entity has been definitely established. It has been described as almost identical with trigeminal neuralgia, the only difference being slight variation in the distribution of the pain. In the case reported by Albright, the correct diagnosis was made after attempts to stop the trigeminal neuralgia had resulted in anesthesia of the fifth nerve without affecting the pain complained of by the patient suffering from glossopharyngeal neuralgia. A review of the literature reveals that all of the methods for stopping trigeminal neuralgia have been employed by different clinicians before diagnosing the condition as one of ninth nerve involvement. The third division of the trigeminus has been injected, the sensory root of the fifth has been cut and the gasserian ganglion has been removed, all with the same result, namely, anesthesia over the distribution of the fifth nerve being obtained, but no relief from the spasms of pain. In some cases of neuralgia of the glossopharyngeal, a definite trigger area has been found in the area supplied by the nerve, irritation of which starts the spasms of pain and anesthesia of which promptly controls the pain. This area is usually in the tonsillar region, either in the fauces or at the junction of the anterior pillar and the

base of the tongue. In the author's case the pain was severe and persistent, it becoming necessary to advise section of the roots of the ninth nerve. The operation had not yet been made at the time of this report.

SUPERIOR CERVICAL SYMPATHETIC GANGLION SYNDROME. F. E. PALMER, Laryngoscope **36**:580, 1926.

Otalgia and unilateral headache are often extremely difficult to classify as to etiology, and even more difficult to treat with any degree of satisfaction. Palmer describes a syndrome consisting of this type of pain, together with a tender area in the side of the neck over the location of the superior cervical sympathetic ganglion, and which is associated with a nasopharyngitis, either alone or together with involvement of the nose and throat. No complaint is made by the patient of the tender area in the neck, it always being necessary to search for this part of the syndrome. Pressure on this area will serve to exaggerate the pain in the head and ear, and, if applied at a time when the pain is temporarily absent, it will produce it. The pain then ceases when the pressure is released, thereby establishing a direct connection between the two. The author states that the pain does not seem to take a definite course as in the case of Sluder's syndrome, nor does it show any tendency to become localized at any particular point. One case is mentioned in which some relief was obtained from cocainization of the sphenopalatine ganglion, the relief being from the pain in the head while the otalgia remained unchanged. Results of examination of the ears in these cases were negative, as were also those of the nasal sinuses, except in one case, in which there was a bilateral maxillary sinusitis. The symptoms in the author's cases cleared up following the disappearance of the nasopharyngeal infection.

THE EXPERIMENTAL CAROTID INJECTION OF PROCAINE HYDROCHLORIDE. KARL M. HOUSER, Laryngoscope **36**:587, 1926.

After a detailed account of the history, chemistry, usage, toxicity and physiologic action of procaine hydrochloride, the author reports the results of his investigations on its experimental injection into the internal carotid artery of the dog. It was attempted to learn whether a dose larger than that usually used in tonsillectomy would produce death if injected into the internal carotid, as it is conceivable that this artery could receive the total dosage at the time of injection. It was found that more than twice the amount of procaine hydrochloride used on one side in the usual tonsil operation can be injected directly into the internal carotid artery of the dog without giving rise to severe toxic symptoms. The respirations became more rapid and shallow, but soon returned to normal.

Certain precautions and therapeutic measures are listed by the author, in which he suggests that the surgeon be on his guard for susceptible subjects and detect them by a preliminary subcutaneous dose of 0.5 cc. of a 0.5 per cent solution of procaine hydrochloride. The lowest possible concentration should be used, this usually being 0.5 per cent. The surgeon should insist on a carefully prepared solution. Any solution containing a sediment should be condemned. Injection directly into the blood stream should be avoided. Rapid absorption can best be prevented by using epinephrine chloride in a concentration of 1:50,000 incorporated with the procaine hydrochloride solution. The therapeutic indications in cases of poisoning are to continue respiration and support circulation until the liver and other organs which may share in the

disintegration of procaine hydrochloride be given an opportunity to exert their detoxifying actions, which in the case of this drug is rather rapid. To accomplish these efficiently, artificial respiration, cardiac massage and epinephrine chloride (from 10 to 15 minims) intravenously or directly into the heart should be used.

SNAPP, Grand Rapids, Mich.

TREATMENT OF LUPUS OF THE FACE. O. G. KALINA, Monatschr. f. Ohrenh. **4**:291 (April) 1926.

Unusually satisfactory results are reported by the author in the treatment of lupus and tuberculous lesions of the face, nose and oral mucosa with diathermy (fulguration). Only a delicate scar remains which enhances the general cosmetic effect.

The advantages of this method are its easy application, and short duration of treatment without hospitalization of the patient. The period of observation of 193 patients varied from one to thirteen months. Irradiation with Finsen's lamp was used in all cases of advanced tuberculosis; patients with incipient cases were treated locally only. In thirty-nine patients receiving only local fulguration, 82 per cent of the lesions were healed completely. In 154 advanced cases, receiving both Finsen's light and local therapy, 83 per cent of the lesions were healed.

GLOWACKI, Detroit.

OSTEITIS MANDIBULAE WITH BRAIN COMPLICATIONS. JES JESSEN, Proc. Danish Soc. Otolaryng., Hospitalstid. **69**:83, 1926.

The author reports a case of idiopathic osteitis of the mandible. The patient was a shoemaker, aged 40, who developed a peritonsillar abscess two weeks before admission. The abscess ruptured the day before admission. At examination he showed a draining perforation above the right tonsil and a tender, inflamed swelling externally which centered about the angle of the jaw and extended upward on the cheek and down to the middle of the neck. This was opened under a general anesthetic, and was found to communicate with the peritonsillar abscess. Four days after admission a large abscess developed down on the neck extending to the clavicle. This was also opened under a general anesthetic. The organism found in the pus was a hemolytic streptococcus. A roentgenogram of the vertebrae and the base of the skull showed nothing abnormal. The vertebrae, mastoid process, posterior margin of the ramus of the mandible, the hyoid bone and the clavicle were all explored for denuded bone eleven days after admission. None was found. Fourteen days after admission a parotitis developed which suppurated. Finally, twenty-four days after admission, another exploratory operation revealed an area of denuded bone on the ramus of the mandible. Despite wide incisions and irrigation with solution of chlorinated soda, the patient died thirty-six days after admission, with signs of intracranial complications.

Necropsy showed the following: osteitis with necrosis on the lateral aspect of the ramus of the right mandible; an extension of this process between the coronoid and condyloid processes to the tonsil region, where the peritonsillar abscess had formed; partial destruction of the condyloid process; involvement of the mandibular fossa and articular tubercle; a corresponding area of osteitis in the middle cranial fossa with a localized pachymeningitis, and a temporal lobe abscess the size of a walnut.

ANDERSON, Duluth.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Annual Meeting, May 3, 1926

HARRY L. POLLOCK, M.D., *President, in the Chair*

NEW SURGICAL PROCEDURE IN THE TREATMENT OF ATROPHIC RHINITIS, WITH AND WITHOUT ACCOMPANYING OZENA. Presented by DR. HARRY L. POLLOCK.

For many years Dr. Pollock has made a special study of this disease. As the etiology is unknown, there are almost as many theories as to the causative factors as there are writers on this subject. Whether it is due to a secondary degeneration following a primary hypertrophy of the turbinates, or to an abnormally wide intranasal space, or secondary to a primary suppurative sinusitis, or to a specific micro-organism, or to a dysfunction of the endocrines, the fact remains that as long as there is an abnormally large intranasal space the cardinal symptoms, namely, crust formation, mucopurulent discharge, odor and dry pharynx or larynx, persist. If after careful and painstaking attention is given the coexisting sinus infection, the abnormally large intranasal space can be lessened, then, and only then, will there be an amelioration or cessation of the symptoms. This can be accomplished by two methods, first, swinging the lateral antral nasal wall toward the septum and holding in that position by causing synechia between the wall and septum, and, second, bringing the septum toward the lateral wall. The first procedure has been performed by Dr. Pollock (Halle or Lautenschlager operation), and while temporarily there is an improvement, within a year, on account of the retraction of the wall toward its original position, the symptoms are as persistent as before the operation.

The second procedure, namely, of bulging the septum toward the lateral wall, has been performed by Dr. Pollock with great success.

The first material employed was paraffin, not by injection under the mucoperichondrium but by inlays. This necessitates the first step of a Killian submucous resection, namely, a small incision and an elevation of the mucoperichondrium. The effects of this operation often resulted in a cure, i. e., as long as the paraffin remained in place, but being a foreign body, it almost invariably sloughed out sooner or later.

The author then tried out other material, and found that bone and cartilage were the ideal implants. These were obtained from the septums of other patients requiring a submucous resection. It was ascertained that it usually required two septums to fill up the one side of a nose with atrophic rhinitis. This arrangement was often difficult or impossible to carry out, as often one of the patients requiring submucous resection failed to make appearance for the operation. Dr. Pollock then tried bone and cartilage transplants from the patient himself, namely, bone from the tibia and cartilage from the rib. While this was fairly satifactory in a manner, there were many objections to the procedure. First, the patient did not like to submit to two operations; second, the implants occasionally sloughed out and then it was impossible to obtain the patient's consent for another operation; third, infections occasionally

occurred in the operative terrain, and these secondary infections at times become serious, as, for instance, pleurisy, osteomyelitis of the ribs, sternum or tibia; and, fourth, spontaneous fractures of the tibia have been reported in the literature following removal of a small piece of bone.

Dr. Pollock, having had success with ivory in external nasal plastic surgery, decided to use this material for intraseptal implants. Success was anticipated as the construction of bone and ivory is very similar. He then explained the simplicity of the operation when ivory is employed. Small pieces of ivory are prepared with rounded edges, the implants being from 1 to 1½ inches in length, ¼ to ⅜ inches in height, and about ¼ inch in thickness. Naturally before intraseptal operation is done, the ethmoidal sinuses are always curetted, the others are given attention if necessary. Middle turbinates are never removed.

In Dr. Pollock's later cases these implants were perforated, trusting that connective tissue would grow through them, and while giving support to them would also assist in nutrition to the underlying cartilage. The ordinary submucous elevation is done and the implants slipped into place, it being unnecessary to sew the edges of the incision. The first operation was performed one and one-half years ago and, while the number is comparatively small, so far in only two cases has the implant sloughed out, and in both cases too much ivory was used and the edges were sharp. There is very little reaction after this operation and the patient leaves the hospital the next day. So far, only one side (usually the most atrophic side), has been operated on for fear of losing the nasal septum by lack of nutrition. The symptoms disappear very soon, and in a short time the patient is practically free from the nasal complaints, namely, odor, purulent discharge from nose and crust formation, and so far all patients have remained free.

Dr. Pollock then showed lantern slides of the apparatus for making the implants, and also roentgenograms of a number of patients before and after the ivory implants.

AMERICAN OTOLOGICAL SOCIETY

Annual Meeting, held in Montreal, Canada, May 31-June 3, 1926

PRESIDENTIAL ADDRESS. DR. T. J. HARRIS, New York.

In July, 1926, The American Otological Society completed sixty years of existence. The growth of otology in America in the eighteenth and the early nineteenth centuries was slow and struggling, as it was also in Europe at this time. Early works on the subject published in America were: "Anatomy of the Human Ear," 1821, by J. C. Saunders, of England, edited by William Price of Philadelphia; "Diseases of the Internal Ear," translated from the French of Saissy, by Nathan R. Smith, of Baltimore, in 1829; and "Diseases of the Ear" by von Troltsch, translated by St. John Roosa, in 1864. These were all works of real scientific value; but at that time there was also an enormous amount of ignorance and quackery connected with the treatment of ear diseases. Even the translator of Von Troltsch supposed that so little professional interest would be felt in his work that no result would be seen from it in his lifetime. However, this has not proved the case, as the establishment of active societies, the foundation of special journals, and great improvements in methods of practice and diagnosis have manifested the widespread

scientific interest in otology. The day has arrived when otology ranks with ophthalmology, a specialty to which it was at first merely an appendage. It may be said that the discovery of the laryngoscope in 1840 gave a tremendous impetus to the scientific study of the ear, in America and Europe. Americans went abroad to study in Vienna, and many of the leaders of the present day studied under Politzer. They brought back with them the enthusiasm and knowledge which led to the establishment of the Otological Society, as a separate and distinct association from the Ophthalmological Society, of which it was at first only a section. The first independent otological meeting was held at the Ocean House, Newport, R. I., July 22, 1868. Nine members were present. Dr. E. Williams of Cincinnati was president. A constitution and by-laws were formulated at this meeting. Twelve new members were elected, making a total of twenty-one the first year.

Among the outstanding members of the early years of the Society may be mentioned Dr. E. Williams, Dr. Cornelius R. Agnew, Dr. Henry D. Noyes, Dr. D. B. St. John Roosa, a man of particularly high intellect, and the first to contribute a paper on the differentiation between disease of the middle and the inner ear. Drs. O. D. Pomeroy and J. Orne Green were two prominent and well trained otologists who did much toward the scientific contribution of the Otological Society. Five other prominent and slightly later members were Drs. Albert H. Buck, New York; C. J. Blake, Boston; Herman Knapp, New York; Charles H. Burnett, Philadelphia, and Samuel Sexton, New York. These five men contributed much to the early proceedings of the Society.

The records of more recent members, known to us all, are no less creditable. Their work speaks for itself. We shall not rest with what has been accomplished, however; the future of scientific otology in America is very bright. This meeting marks the beginning of a new era, and we can hope that the next fifty years will witness marvellous, and as yet undreamed of, triumphs in the specialty of otology.

Treatment of Lateral Pharyngeal Bands for Deafness by Roentgen-Ray. Report of 100 Cases. Presented by Dr. D. C. Smyth, Boston.

This paper sums up the results of 103 cases of various types of deafness and tinnitus having redundant lymphoid tissue present in the lateral pharyngeal wall treated by roentgen ray. Case histories were taken, and accurate hearing tests were performed by the ordinary method and by the audiometer, before and after treatment.

The conclusions arrived at were as follows:

1. Treatment of enlarged lateral bands of lymphoid tissue in the nasopharynx by roentgen ray seems to be an aid in cases of deafness or tinnitus of short duration.

2. In cases of recurring acute tubal deafness, it seems to be a decided aid.

3. Deafness of long standing (from 10 to 15 years) showed no improvement in any of the cases treated.

4. The majority of patients improved were young, from 8 to 15 years.

5. There seemed to be no relation between improvement of the hearing and tinnitus and the macroscopic appearance of the pharynx. Some of the patients showing most improvement of hearing showed no mascroscopic change in the

pharynx, and vice versa. Some in whom the throat cleared up nicely showed no improvement in hearing.

6. This last observation bears out the fact that there is lymphoid tissue found in the eustachian tube, and it is probably due to the destruction of this tissue that some of the patients are improved.

DISCUSSION

DR. MCCOY, New York: If the improvement in lymphoid tissue did not always go with the improvement in hearing, that proves there must be some other factor at work in the improvement in these cases. In our work we found that if we could control focal infections we could eliminate a great deal of chronic toxicity, which had effect on the auditory nerve and produced more or less impairment of hearing.

DR. JARVIS, Rutland, Vt.: I believe that the value of this paper this morning is in the fact that it leads us to a consideration of the whole environment of the subject in dealing with his deafness. Diet, hygiene, occupation and economic conditions should all form part of this study, if any improvement is to be gained.

DR. CHARLES RICHARDSON, Washington, D. C.: This demonstration is most illuminating, and we should all appreciate the efforts that have been made. Dr. Jarvis emphasizes dietary restriction. I can corroborate this. I find that after an orgy of sugars or fats in the diet, many people will respond by attacks of recurrent deafness, which can be controlled by elimination of these substances.

DR. E. P. FOWLER, New York: I have always been skeptical about improvement from the use of roentgen ray in deafness. It works two ways. It may do good; it may do harm.

DR. J. E. LOGAN, Kansas City, Mo.: When the mouth of the eustachian tube, the lateral pharyngeal vault, and the fossa of Rosenmueller are obstructed by lymphoid tissue, there is more or less restriction of the tensor and levator palati, and tensor tympani, with consequent progressive deafness. Actual surgical procedure will often give permanent improvement of hearing in these cases. I do not use the roentgen ray.

DR. E. B. DENCH, New York: This matter of roentgen-ray treatment was thrashed out in New York. It was found that the current used was so slight, that it made no impression on the photographic film. It was too mild to have effect one way or the other.

DR. S. MCCUEN SMITH, Philadelphia: We should be very grateful to Dr. Smyth for bringing these facts out. Dr. McCoy used the roentgen ray; does he think it would produce atrophy of the salivary glands? Also, would it benefit lesions of the nasal accessory sinus?

DR. MCCOY: There has never been any effect on the salivary glands.

DR. SMYTH (closing): I thank the members for the discussion. I was not treating deafness by means of the roentgen-ray. I was classifying results in 100 cases with hypertrophied lymphoid tissue, in whom deafness was more or less chronic, to see whether reduction of lymphoid tissue made any change. Results seemed to show that the state of the lymphoid tissue did not have anything to do with the deafness.

EXPERIMENTS IN INTERPRETATION OF SPEECH BY AID OF COMBINED TACTUAL AND VISUAL IMPRESSIONS. Presented by PROF. ROBERT H. GAULT, Northwestern University (by invitation).

Published in full in the September issue.

DISCUSSION

DR. M. A. GOLDSTEIN, St. Louis: Professor Gault's work contains applications of the same principles as have been used in the Braille system for the blind, and the use of tactile impressions in the Montessori method of teaching, that is, the development of all the avenues by which contact with the outer world is maintained. Does Dr. Gault blindfold his pupils when giving them their training?

DR. CHARLES RICHARDSON, Washington, D. C.: This is a scientific system of training of the tactile sense, which we have known for a long time in a desultory, unscientific way, which can be used in connection with the interpretation of speech.

PROF. R. Q. WAEGEL, Bell Telephone Laboratories (by invitation): In tracing up the development of hearing organs, from the lower vertebrates we can identify lateral line organs which are purely for the conduction of tactile impressions, in other words, for sensing vibrations by bone conduction. As the animal progresses it increases its equipment to catch impressions by air conduction, and to disperse sounds into different frequencies. The work of Drs. Gault and Goldstein is toward increasing sensitivity of reception of sound by air, and by dispersion of pitch.

PROFESSOR GAULT (closing): In answer to Dr. Goldstein, the speaker is out of sight in some experiments; in others we supplement the tactile lessons by allowing the speaker to be seen. This work I believe will add a great deal to the enjoyment of the deaf, by allowing them to appreciate rhythm and accent. They get pleasure from rhythmical poems, such as Southey's "Waters of Lodore."

THE COMPARATIVE ANATOMY AND PHYSIOLOGY OF THE AUDITORY TUBE IN ITS RELATION TO THAT OF THE MIDDLE EAR. Presented by PROF. A. G. POHLMAN, St. Louis (by invitation).

A very intimate correlation of the work of physicist, morphologist and otologist is necessary before advances in otologic research can be expected. When sufficient research subsidies are available for complete analysis of sound transmission, we may accomplish more for the amelioration and cure of deafness.

We are handicapped in researches on the ear, because the ear (as compared with the eye) covers ten octaves of vibrations, while the eye covers less than one, and also because sound is impossible to control experimentally. The eye also was quite developed in aquatic forms of life, while the ear is a double organ, the older organ of equilibration, connected with the midbrain, the cerebellum and the spinal cord, and the hearing end-organ itself, which appeared late in the metamorphosis of the artery suppressed in passing from the rodents.

We will confine ourselves to two forms, bird and mammal, in which dissimilar structures accomplish the same results, that is, hearing of air transmitted sounds. Comparative anatomy seems to point to the fact that the old Helmholtz lever theory for sound transmission must be changed. An essential requirement in physics is that of a balanced, damped, drum membrane. The

single tympanic muscle in birds, and the double tympanic muscle in human beings, are part of a mechanism for holding the balance of a drum membrane which may have to adjust itself to any stimulus varying from one to a million times that amount. Hence a shock absorber is needed. The function of an auditory tube is to maintain reasonable balance in the drum membrane. The tube is closed in both birds and mammals, but in birds the drum membrane is more movable, as it is subjected to greater barometric variations. The ventilation of the tube is based on similar principles in birds and in mammals.

Study of abnormal human cases may be of great interest to the laboratory worker in evaluation of middle ear mechanics. The mastoidal dehiscence (the bugbear of otologists) may prove a godsend to the laboratory worker. He might apply air transmitted sounds directly to the medial surface of the drum membrane. There are great possibilities to this experimental work. Such cases should be referred to the experimental laboratory. The autophonic subject, with functional patency of the tube, should also be studied.

Experiments on air transmission of sounds, by catheterization of the middle ear, have not been very convincing, as the catheter always plugged with mucus, so that reports on sound transmission could not be reliable.

The comparative anatomy and physiology teach us that the auditory tube is normally closed. When negative pressure arises in the middle ear, the air is probably sucked from the nasopharynx, particularly when the dilator tubae has contracted and established a less resistant pathway. There is, however, no experimental evidence that each contraction of the dilator tubae ventilates the middle ear, nor does it appear necessary to a perfect functional balance of the drum membrane.

DISCUSSION

Dr. E. B. Dench, New York: I think Dr. Pohlman is a little mixed between pitch and intensity. The ossicular chain does not take part in the perception of high tones; it is only in the perception of the lower tones that the lever like action is important.

Dr. P. D. Kerrison, New York: I think that the only agency for maintaining balance of pressure on both sides of the drum membrane is pressure change. Dr. Duel has described conditions for a healthy tympanum, that of a patent tube, and frequent deglutition. This is shown with patients who have extremely hyperemic tubes. Inflation often causes increased deafness, but if they are asked to swallow, the symptoms are relieved. Sudden deafness which occurs from atmospheric pressure may also be relieved by swallowing.

Professor Pohlman (closing): Additional muscles are required for tubal control in the mammal. I think a great many procedures have been carried out for deaf people with very little effect. If we continue to worship at the old shrines we shall not make progress. I am not primarily interested in the mechanics of hearing, but I would like some poor soul who is so deaf that he cannot hear anything, appreciate it when I swear at him.

Pathology and Surgery of the Eustachian Tube, with Special Reference to the Value of Closing It. Presented by Dr. Thomas H. Halsted, Syracuse, N. Y.

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THE LOCAL TREATMENT OF THE EUSTACHIAN TUBE, WITH ESPECIAL REFERENCE TO THE PRESENT STATUS OF THE BOUGIE. Presented by DR. ARTHUR B. DUEL, New York.

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THE COOPERATION AND INTERFERENCE OF REFLEXES FROM OTHER SENSE ORGANS, WITH THOSE OF THE LABYRINTH. Presented by PROF. R. MAGNUS, Utrecht (by invitation).

After loss of both eyes the patient is blind for life, and no mitigation is possible. With some other organs compensatory function is possible; thus absence of pepsin in the stomach is compensated for by trypsin of the pancreatic juice, and erepsin of the intestine. The labyrinths provide a similar example of compensatory function, especially as regards the otolithic maculae. These sense organs evoke static reflexes. Other sense organs call forth static reflexes of approximately the same kind; therefore the static functions of the body depend, not only on the labyrinths, but also on other stimuli as well. To understand, therefore, effects of lesions of the labyrinth, we must understand these other cooperative reflexes and mechanisms also.

There are two main types of reflexes, namely, (*a*) reflexes from the ampullae of the semicircular canals, evoked by movement and by acceleration, and (*b*) reflexes from the otolithic organs which depend on the position which the otolithic maculae have in relation to the horizontal plane. The latter are mostly of tonic character, but may also be stimulated by acceleration.

The otolithic maculae reflexes can be classified as: Attitudinal reflexes; Compensatory eye positions; labyrinthine righting reflexes.

Attitudinal reflexes are found by changing the attitude of the head, each attitude having a corresponding body position. These are demonstrable in animals and in infants.

Compensatory eye positions are those changes in orbit, of the eyes, by which they turn in the opposite direction to a changed position of the head, thus compensating for a change in head position.

Righting reflexes are those by which the animal automatically restores itself to normal from an abnormal position.

Analysis of the last group (righting reflexes) shows that five types may be operative; these are:

Labyrinthine Righting Reflexes.—This reflex brings the head of the animal into normal position in regard to space, no matter what position is forced on the pelvis. This reflex depends on intact otolithic function.

Body Righting Reflex, Acting on the Head.—This reflex is caused by pressure sense organs acting on the body surface. The head is righted in relation to space and to the ground.

Neck Righting Reflex.—When the animal is held in some abnormal position, rotation of the neck occurs until the whole animal is in normal position.

Body Righting Reflexes Action on the Body.—These reflexes right the body in relation to the ground, independently from the position of the head.

Optical Righting Reflexes.—These reflexes are present in the higher animals and depend on optical attention. The head is brought into normal position as the objects in the environment are visualized.

To summarize: In higher mammals, with intact cerebrum, there are three groups of reflexes which right the head, namely, otolithic, tactile and optical;

two reflexes right the body, namely, proprioceptive (from the neck) and tactile. Orientation takes place partly in relation to the ground, partly in relation to space. There is a multiplicity of cooperating influences, so that if one mechanism be paralyzed, function will not be lost.

OTOLOGICAL STUDIES OF CAVERNOUS SINUS THROMBOSIS. Presented by DR. WELLS P. EAGLETON, Newark, N. J.

This communication is to call the attention of the otologist to a group of diseases which are far from uncommon, but which do not receive due attention. Let us consider cavernous sinus thrombosis and phlebitis of otitic origin. How can it be diagnosed? What surgical steps can be taken? Surgical steps depend on early diagnosis. That this condition is not as infrequent as we have thought is shown by the work of Bruening, in which he made a careful necropsy on twenty-two cases, in which the patients died of generalized aural sepsis, in which cavernous sinus thrombosis was suspected. Twelve out of twenty-two had involvement of the cavernous sinus, with symptoms supposed to be due to thrombosis of the petrosal or jugular. During the last few years I have seen a number of cases, and I have complete records of twelve necropsies on cases of cavernous sinus thrombophlebitis. Six of the cases were of otitic origin in the twelve necropsies. Another point is the relation of the sphenoid to cavernous sinus thrombosis. This has long been recognized by O'Malley. He found that in all the patients who died as the result of tonsillectomy, all had had involvement of the sphenoid as found at necropsy. It is to offer you an explanation of these conditions that I present you this essay.

Another very important point to remember is the relation of the carotid artery and its involvement in relation to cavernous sinus thrombosis of otitic origin. It is the relation of the carotid artery to the venous plexuses that surround it which accounts for the frequency of the pathologic changes. It is only by study of these points that we shall be able to make an early diagnosis.

I will make a drawing here in which I outline (1) the cavernous sinus; this is lying behind the jugular bulb; (2) the ophthalmic vein; (3) two veins that run down directly into the nasopharynx. In the interior end of the cavernous sinus there is a small plexus of veins coming from (*a*) the foramen lacerum, (*b*) the foramen ovale. Here then is the carotid artery and here is the plexus of veins that pass directly from the jugular bulb. This forms an interior lake of veins that pass directly from the jugular bulb and meet at the junction of the cavernous sinus and the carotid centers. The veins pass through the foramina ovale and lacerum.

There are then two ways in which this condition arises; first, through the petrosal; that is, when the middle ear infection extends through the superior petrosal from the cavernous sinus; second, through the inferior petrosal from the jugular bulb.

This group of cases is pretty well recognized. A clot forms in the posterior portion of the cavernous sinus and gradually crawls forward, giving time for the reestablishment of the return circulation, with the result there is never any exophthalmos or chemosis until the ophthalmic vein is involved at the terminal stages. This type should be recognized. How can we recognize it? The thrombosis and the phlebitis are two separate conditions; one is the result of the other. When the infection passes from the superior petrosal, it is very apt to involve one or other of the branches of the fifth nerve, with pain behind the eye or pain in the teeth. Many patients have had the teeth removed,

when really the cause of the pain was infection around the vein, going forward into the cavernous sinus. When it passes over the sixth nerve, there is an extra-ocular paralysis. There may also be involvement of the third or fourth nerve. The involvement of the sixth is from infiltration around the cavernous sinus. This infection comes from behind, and does not cause exophthalmos until there is a terminal process. Of course if the process is very active, there are eye symptoms, but with the chronic cases, with up and down temperature, there is no chemosis.

When the small venous plexuses surrounding the carotid artery are involved, infection comes up through the carotid canal, and strikes the cavernous sinus at the anterior point. Infection passing through a dehiscence of the floor strikes the jugular bulb and involves the small plexuses surrounding the pulsating artery; immediately it is propagated forward to the anterior end of the cavernous sinus and involves the venous lake. Then a transient exophthalmos chemosis or paralysis is present. But as the anastomoses are very free, the circulation returns and you think that the patient is doing well, even when the condition has already involved the cavernous sinus. Later there is recurrence with secondary septic condition, whereas in the early stage the exophthalmos was due to phlebitis.

How then can we recognize these cases?

If there is running ear, with signs of sepsis, with slight chemosis and slight exophthalmos, the infection has passed up the carotid plexus and has involved the cavernous sinus.

What has the nasopharynx to do with these symptoms?

If the literature is examined, there are a large number of cases in which the infection has developed in the upper and lateral wall above the bulb, so it cannot be seen by aural examination. There is an abscess due to involvement of the veins going downward.

What can we do for the condition if we recognize it?

I want to report one case: Here is a chart which looks exactly like the ordinary chart of sinus thrombosis. The child had earache; that night the child became delirious. Paracentesis was performed. There was very rapid pulse. One week later the child was operated on for mastoid involvement and nothing was found. After operation he had transient chemosis with slight exophthalmos. Infection had already passed through the dehiscence and involved the cavernous sinus on the eighth day after the earache. The temperature continued up and down. The lateral sinus was explored, and nothing was found, but the up and down temperature continued. There was one chill at the beginning and one on the twentieth day of the disease. Blood cultures were negative all through. On the twelfth day the boy had recurrence of the exophthalmos. It was then decided that he had a cavernous sinus thrombosis. The diagnosis of jugular bulb phlebitis was made, because of the rapid onset. The jugular bulb was opened, but still the temperature kept fluctuating. On the twenty-third day a swelling developed, but the patient did not complain of sore throat although he had difficulty in swallowing. There was nothing to be seen in the throat, but a soft mass could be felt above by palpation. The mass disappeared; we had paid little attention to it. The child eventually died.

There was no further exophthalmos or chemosis. The child had no petrosal sinus or jugular sinus condition, but infection had passed through the carotid plexus. Here is the important point: If you recognize early petrosal infections coming from behind, by symptoms of pain, by involvement of the fifth nerve, by ocular paralysis from involvement of the third and fourth nerves, if you

ligate the common carotid you will give the phlebitis a chance to subside and a certain proportion of the patients will recover. If the infection has gone up to the carotid plexus, it is more important to ligate the internal or common carotid and put the parts at rest.

I do not advocate the operation Dr. Mosher described, of removal of the eye and reaching the cavernous sinus from the front. If you do not want to sacrifice the eye, you can go through the floor of the middle fossa. The common carotid should be ligated, for, if not, the patient will die from hemorrhage.

Dr. Harris P. Mosher, Boston: I have never been able to do the operation attributed to me by Dr. Eagleton. We have had, as always from Dr. Eagleton, clear thinking on a dark subject. There is no condition more difficult to deal with than cavernous sinus thrombosis. I was aware of the importance of the pterygoid plexus, but not of that of the small plexus of veins running from the jugular bulb to the anterior part of the sinus. I have usually associated this type of infection Dr. Eagleton speaks of with infection of the pharyngo-maxiallary fossa by extension down from the bulb. I do not agree that the infection travels by a dehiscence. I do not think the transient symptoms mentioned are sufficient guide for operation; until he gives us something more than that, I think the operation will be performed mostly by Dr. Eagleton, not by the ordinary otologist.

Dr. Edward B. Dench, New York: Being an ordinary otologist, I would like to ask why Dr. Eagleton selects the common carotid rather than the internal carotid.

Dr. Ewing W. Day, Pittsburgh: When the eye is removed, the petrosal can be syringed by a simple suction tube introduced into the anterior end of the cavernus sinus.

Dr. T. J. Harris, New York: I understand that Dr. Eagleton has succeeded in tying the common carotid. I wish he would tell us something about that.

Dr. Wells P. Eagleton, New York (closing): Dr. Mosher said he could not get his operation to work. Neither could I. The only patient on whom I tried it died on the table from hemorrhage. In the next patient I tied the common carotid, because it was easy. That method worked. In regard to the number of cases, I have cured four patients of cavernous sinus thrombosis.

Pathological Changes in the Mesenchyme of the Middle Ear of Fetuses, or Mesenchyme of the Human Cavum. Presented by Dr. Norval H. Pierce, Chicago.

I shall proceed at once to the demonstration of the labyrinth capsule, to place before you what we are attempting to do in the demonstration of the otic capsule by the committee on the study of progressive deafness. I shall illustrate this by slides. First, we have a microscopic section of the eustachian tube, very near the pharyngeal opening. This is lined by columnar and ciliated epithelium. This changes very suddenly to the cuboid epithelium of the cavum, and under normal conditions changes to mesenthelium. This is a very delicate, thin, pavement shaped epithelium, consisting of one or two layers. If this persists into adult life, you have one of the components of chronic catarrhal deafness. Between the mesenchyme and the tympanic membrane the malleus is meshed in the tympanic membrane. The inner layer is from the mesenthelium, derived from the outer layer of the eustachian tube, or entoderm. You will notice that the tympanic membrane is beginning to split from the

ectoderm which is being sent into the external auditory canal. One layer forms the outer layer of the tympanic membrane, and the other forms that of the external auditory canal. This layer of ectoderm is sent in as a process of the epithelium and then splits to form these two coverings. You will note that even at this time there is a complete separation of the mesenchyme from the tympanic membrane.

There is an erroneous idea, which is very general, that we can judge by the tympanic membrane in adult life as to the character of the mucosa of the middle ear or as to the amount and extent of pneumatization. This is wrong, because at this very early age the mesenchyme is cleft from the tympanic membrane. The tympanic membrane goes on its own way independent of the development of the mesenchyme.

Sometimes we see evidence of the short process of the malleus being nipped up. That is a sign of arrested pneumatization, owing to absorption of oxygen above the process in the attic, due to bands of organized mesenchyme persisting into adult life, and preventing ventilation of the attic. As you can see by the slide, pneumatization is very different in different portions.

The second slide shows a later stage of development. The tympanic membrane is a little further split off. The vessels are pushed into the posterior portion of the capsule in a discrete manner into the area which will be pneumatized.

The third slide shows pneumatic spaces in the act of formation. At the beginning the process is simple, as with other marrow spaces. The mesenchyme differs from that of the middle ear. It has the character of embryonal tissue. It has replaced the marrow, though there are a few marrow spaces left. In the portion over the mesenchyme of the entoderm, beginning absorption of the embryonal connective tissue may be seen. The spaces will enlarge until the mesenchyme is entirely absorbed.

How does the mesenthelium get into the mass of the mesenchyme? Wittmaack says that it simply dips down like a curtain from the mesenchyme, but it is much more complicated than that. I think it has to do with the blood vessels entirely. It seems in some cases, as in the chicken, that some of the vessels supply the endothelium. This, of course, is not at all orthodox, but it is a working theory. When I showed these specimens to Professor Maxwell, he said it was impossible, but I have seen forms looking like vessels, empty except for a film of some substance, with the corpuscular elements. These young arterioles break open and spread endothelium over the pneumatic spaces. This may be part of the endothelium substance which supplies the mesenthelium.

Another way suggested is that the blood vessels from the outer layer of the mesenchyme of the endoderm, as it is absorbed, takes a course into the space, following the law of Volkmann's canals. This is a possibility which might be considered. As the blood vessels go down into the tissue, it takes with it the mesenchyme and mesenthelium covering the endoderm.

In other words, arrested pneumatization can be regarded as a disease of the mesenchyme. Otitis media neonatorum is a foreign body reaction to the corpuscular action of the amniotic fluid and meconium. It is a disease of the blood vessels which penetrate and bring down mesenthelium. It is a disease of the processes of pneumatization and not merely a disease of the mesenchyme.

Ablation Experiments of the Labyrinth of Frogs. Presented by Prof. John Tait, McGill University (by invitation).

Published in full in the October issue.

THE OCCURRENCE OF OTOSCLEROSIS IN THE ETIOLOGY OF PROGRESSIVE DEAFNESS. Presented by DRS. GEORGE E. SHAMBAUGH and JACOB W. HOLDERMAN, Chicago.

Published in full, August, 1926, issue.

DISCUSSION

DR. ARTHUR DUEL, New York: Dr. Shambaugh has studied 113 cases of otosclerosis, out of 363 cases in his practice. That is a ratio of one in three in his practice, but in others it might be one in thirty. I can confirm the idea that previous middle ear disease, (catarrhal or suppurative) has no bearing on spongification of the labyrinthine capsule, although the two conditions may be concomitant, as may also a toxic neuritis, or auditory nerve deafness. This may confuse the clarity of the picture, especially as symptoms of early otosclerosis occur at a time when toxic nerve deafness also occurs. I have pictured otosclerosis in my mind as a developmental change in the labyrinthine capsule, which prevents sounds reaching the nerve. The nerve perhaps suffers from disuse atrophy. Furthermore, any deafness occurring in an individual after puberty, in whom there is an hereditary history of deafness, should be regarded as otosclerosis. If there is no history of deafness, the condition should not be regarded as otosclerosis.

THE LAYMEN'S EFFORTS FOR THE DEAFENED. Presented by DR. GORDON BERRY.

The Federation of the Hard of Hearing is, as its name implies, an organization to bring the different local leagues for the hard of hearing together, and to standardize their aims. These local leagues have been started by partially deafened persons for the sake of social intercourse with their own kind, and for the educational stimulus of classes.

The Federation at present is working on a program of education and expansion through nine different specialized committees, of which the two most interesting to otologists are probably the research and the educational committees.

The research committee has, with the cooperation of the Bureau of Standards in Washington, been making a careful and much needed investigation of the 70 odd mechanical devices for aiding impaired hearing. It hopes in time to be able to furnish otologists with a scientific list of hearing devices classified on a definite scale.

The research and educational committees jointly are working on the problem of the deafened school child. The National Educational Bureau has authorized the Federation to form a committee to make recommendation, first: How to discover the deafened child; second, rules for medical care; and third, how to teach it lip-reading.

During the past year, the committee has been trying to discover a uniform and accurate method of testing the hearing of school children. Extensive research work with the watch and whisper tests and the Western Electric 3A buzzer type audiometer and the 4A phono-audiometer is reported. By the last method forty children can be tested at one time, the test only taking fifteen minutes. By such more accurate means it is found that partial deafness is far more prevalent than had been supposed. The results show as high as 12 or even 15 per cent of the children with one or both ears impaired, in contrast to 6 or 8 per cent shown by the older methods.

Equally interesting is the manifold work of the other committees. One handles a national lip-reading tournament for adults; one finds work for deafened unemployed; one deals with standardization of lip-reading methods; one is organizing and conducting a lip-reading teacher's conference.

The work of the Federation is growing rapidly and is nation-wide. It proves the most constructive and forward looking lay agency working in behalf of the hard of hearing that we have.

DIFFERENTIAL DIAGNOSIS OF DEAFNESS IN SCHOOL CHILDREN. Presented by DR. E. P. FOWLER.

Many methods were used in the examination of the 1,000 pupils in various rooms and under varying conditions. All were finally discarded for a new instrument — the phonograph audiometer (4A), which substitutes for the speech of the tester figures so recorded that each group thereof may be reproduced with a difference in their intensity of 3 sensation units. A loss of 9 sensation units, or more, indicated defective hearing. In groups of forty, up to 150 pupils may be tested in an hour. Lantern slides of typical questionnaires and record charts were shown and the results obtained in a typical class of thirty-eight were given. A summary of the results obtained in the whole school was also given.

Audiograms of both ears were made of all defectives by the 2A audiometer, also a complete otologic examination. For diagnosis reliance was mainly on the history and the audiogram, though the first was often elusive. The audiogram was indispensable, because a majority of the deafened ears appeared no different from scores of others possessing apparently normal average hearing. Bone conduction and the noise apparatus were used in the usual manner.

The audiograms showed the following characteristic variations in:

1. The direction of the slope of the curve (i. e., ascending or descending) as read from left to right.

2. Absence of any marked tendency to slope (up or down).

3. Distance of the curve below normal or below that of the opposite ear.

4. An abrupt ascent or descent near the right of any curve.

The audiograms were, therefore, classified as follows:

Type and Grade.—A1 *Ascending.* Lower tones loss not over 30 S. U. Higher tones 15 S. U. or more above lower.

A2 *Ascending.* Lower tones loss not more than 30 S. U. Higher tones 15 S. U. or more above lower.

A3 *Ascending.* Termination to any curve.

B1 *Horizontal (or Balanced).* Not over 30 S. U. loss on the average.

B2 *Horizontal (or Balanced).* Over 30 S. U. loss, and not over 45 S. U. below better ear.

B3 *Horizontal (or Balanced).* Loop over 45 S. U. below the better ear or the normal, at middle frequencies.

C1 *Descending.* Lower tones 15 S. U. better than higher. Higher tones loss not over 35 S. U.

C2 *Descending.* Lower tones 15 S. U. better than higher. Higher tones loss more than 35 S. U.

C3 Sharp descending termination to any curve.

Lantern slides of actual cases demonstrating this classification were shown and discussed. Each type of curve and the diagnoses were briefly discussed, particularly the elevation and lowering of the higher frequencies as to their meaning, involvement of the nerve or the conducting apparatus. It was pointed out that a loss in certain high frequencies from loading certain limited areas of the conducting mechanism is not only theoretically conceivable, but practically demonstrable in certain cases.

A table giving the number of cases in each class, the diagnoses in both ears and the number of cases with similar curves in companion ears with the diagnoses in the better ears showed the following:

Out of the sixty-one cases there were only fourteen admitting any defect in hearing. Ninety per cent of the cases showed binaural deafness; 66 per cent showed similar lesions in both ears, the diagnosis differing with the history. Omitting six better ears and two better ears with total deafness in the worse ears, in all of which a great dissimilarity of lesions and curves is to be expected, there remain only thirteen cases with markedly differing disease processes in their two ears. In 83 per cent the graphs of both ears were similar in form, even if not in type. Omitting the three total deafness cases in type B3 and the two with normal better ears in type C2, there remain but seven cases which differ in graph form in the two ears. In subtypes A3, B3 and C3, there are greater differences between the worse and better ears in similarity in audiograph form, but only eight out of the twenty-seven in these classes differ in similarity of lesion. The relative coincidence of the seven histories with the determined deafness is as follows:

Number of pupils with negative history and less than 9 S. U. loss in hearing, 414; number of pupils with positive history and less than 9 S. U. loss in hearing, 361; number of pupils with a positive history and 9 S. U. or more loss in hearing, 44; number of pupils with a negative history and 9 S. U. or more loss in hearing, 17; not examined, 155; total, 991. The percentage of deafness found in those examined was 7.3.

Of 361 with good hearing, 240 had histories of earaches and running ears, and seventy-one had had tinnitus. How many, and which of these children with and without histories of ear trouble will subsequently suffer from deafness? How many of those now deafened will go on to greater deafness? Regular yearly examinations would tell us something about these questions, and also if there is any characteristic audiograph types, grades or forms which presage otosclerosis, or progressive, obstructive and nerve deafness.

Had we taken 6 S. U. loss as indicating subnormal hearing instead of 9 S. U., the percentage of deafened ears would have been more than doubled.

DISCUSSION

PROF. R. Q. WEGEL, New York: There is a tendency to link particular types of audiometer curves with different types of lesions, but this has not been entirely borne out. I would like to present an hypothesis of what an audiogram might show. If we make a photomicrograph of the piano sounding board, 35 mm. in length and spread it along the basilar membrane, and then compare this to a player piano, in which the keys are depressed, you could see the same thing happening on the basilar membrane, except that the keys would vibrate. If you took one octave of keys and pushed it up, so that some keys would be wide and some very thin, you would have a case in which the patient had near normal hearing, but had difficulty in distinguishing musical notes, especially chords, and some difficulty in interpreting speech. If one

ear was normal, there would be diplacusis. If you are interested in a more detailed classification than nerve deafness and conduction deafness, we should have to examine the amount of air distortion more accurately, also pitch susceptibility and frequency and intensity susceptibility.

Dr. Horace Newhart, Minneapolis: I believe we are at the beginning of a new period in the subject of otology. This subject is still in its infancy and needs careful study. I believe we should have a clear understanding as to what constitutes normal hearing at different ages in order to have a basis for comparison.

Dr. M. A. Goldstein, St. Louis: We know that there are different positions in the audiograms that lead to definite conclusions. When we have depression of the lower tone limit and normal upper limit, we are dealing with conduction deafness. If there is depression in the upper tone scale, there is nerve deafness. If there is depression of the lower scale and upper scale, and even absence of 64 double vibration scale, we are dealing with otosclerosis.

Dr. H. P. Mosher, Boston: Dr. Shambaugh stands alone in his attainments. He is also alone when he says that chronic progressive deafness is a condition of adult life. I think it is a condition from youth to adult life.

Dr. E. B. Dench, New York: I have had unfortunate experiences with audiometers breaking down, even when set up by experts themselves. I wonder how accurate these charts may be if the instrument breaks down in the hands of the people who make it.

Mr. Bunch, University of Iowa: There may be gaps in the hearing of tones, which are not shown by the audiometer. I do not know what may be the clinical or pathologic significance of this fact. We may have to examine these curves by the microscope, and perhaps even then they will not be explained. In regard to otosclerosis, I believe I can show a typical curve. I know the cases are otosclerosis because Dr. Dean says they are. There are three types of records in otosclerosis, and gaps may occur anywhere in the tone range.

Dr. Edmund P. Fowler (closing): I do not think we know the exact interpretation of these curves yet, but if we examine patients from year to year, over a long period of time, we shall find out. In our study it has been remarkable to find how many patients there are who have a history of suppuration.

The Etiology and Treatment of Nerve Deafness. Presented by Dr. Francis P. Emerson, Boston.

1. In the theory of mechanical deafness, it is difficult to understand why the loss of tone perception always takes place in that part of the scale represented by the whispered voice, while the low notes affected by the conduction apparatus are the last to be involved.

2. In a purulent middle ear process, when the drum membrane and ossicles have been swept away, why is the hearing so good after the toxemia has cleared up?

3. Why do so many patients have perception or nerve deafness, and when did it begin?

4. Why are tinnitus and vertigo such constant symptoms?

In a fulminating middle ear there is marked destruction of tissue in the conduction apparatus, but tone perception is lowered because of the toxemia,

and is partially restored as this clears up. In analogous cases, when distant organs are involved as the result of an acute upper respiratory infection, further damage results with each acute exacerbation of the local process. Have we any evidence that such a focal process causes tissue reaction in the conduction apparatus and through toxemia damages the end-organ?

Otitis Media Secretory.—After the tubotympanic catarrh clears up, the patient is quite deaf before the low limits are raised or the tube is again involved, the hearing being gradually lost in that part of the scale represented by the whispered voice. The process advances irregularly, with early evidence of labyrinthine irritation as shown by marked tinnitus without disturbance of equilibrium, sensitiveness to loud sounds and to wind, vertigo, etc. All deaf patients have lowered tone perception with fatigue. As the disease becomes chronic, the hearing tends to become the same for both ears. If the loss in tone perception goes far enough, there is first increased bone conduction, and as the hearing for the whispered voice is lost the low limits are raised and we begin to have lowered bone conduction in all patients.

Otitis Media Purulent.—Following the acute explosion the tube is involved and the low limits raised, but as the middle ear disease becomes chronic the low limits remain stationary until tone perception is lost for the whispered voice, when it goes through the same process as in a case of chronic secretory otitis media and ends in lowered bone conduction. The course is irregular, marked by acute exacerbations and tinnitus, with no loss of hearing between such exacerbations unless a degenerative process is present.

Hyperplastic Otitis Media.—Chronic hyperplasia cannot exist except as a secondary tissue reaction for chronic hyperplasia means irritation, increased blood supply and cell proliferation, which would involve the lining membrane of the cavum, hence there must have been a primary exudative process which would place these cases as chronic secretory otitis media.

Perception Deafness Without Pathology in the Conduction Apparatus.—In 100 consecutive cases examined, forty-seven came under this head. The drum head was clear, the light reflex present and there was no history of otalgia or a middle ear in childhood. The hearing test was the same on both sides with normal upper and low limits. The hearing for the whispered voice is down and the Rinne test is positive. Tinnitus is often a marked symptom, and may precede the loss of tone perception or the end-organ may be sensitive to wind or loud sounds.

After a secretory, purulent or perception case becomes chronic, there is no typical hearing test of middle ear disease and they all progress and end in the same way as described under the head of chronic secretory without regard to what has happened in the conduction apparatus.

TREATMENT

Remove the focal process and institute follow-up treatment. Most patients will improve if perception for the whispered voice has not fallen below six twenty-fifths. In forty-seven out of 100 consecutive cases the eustachian tube was not a factor. Do not treat the tube until congestion, cell proliferation and active infection in the sinuses, walls of the nares, epipharynx and glands have been relieved and the circulation in the blood and lymph channels has improved. Inflation is of value when the drum head is indrawn or there is an unresolved exudate in the middle ear, but not in chronic cases.

Endocrine dysfunction undoubtedly exists, but attempts at correction have not improved tone perception in the hands of the writer. The use of the radio is a help. Hemolytic streptococci affect the blood as well as intestinal toxemia, and there are often secondary foci in the gallbladder, appendix, prostate, etc. The problem needs a broad conception of the influence of general metabolism and some means, as yet undiscovered, to establish immunity against reinfection.

TABLE 1.—*Case 1, Mrs. J. H., May 20, 1915*

R*		L
6/25	W. V.	6/25
20″/10″	Rinne	32″/15″
	512 C^2	
—	Weber	—
N	U. L.	N
32	L. L.	32

*In this and the following tables, R indicates the Rinne test determined by 256 C or 512 C^2; W. V., whispered voice; Weber, determined by 256 or 512 C^2; U. L., upper limit, monochord or Galton whistle; L. L., Dench fork.

TABLE 2.—*Case 2, Dec. 10, 1915*

R		L
9/25	W. V.	20/25
30″/15″	Rinne	22″/12″
	512 C^2	
—	Weber	—
N	U. L.	N
32	L. L.	32

Miss N. E. G. F. (Case 3), aged 44, had had the condition for ten years. The diagnosis was nerve deafness with lowered bone conduction. The patient was very unstable nervously. There was pain in the right eye, and she was being treated for retinitis. After the extraction of two abscessed teeth the retinitis cleared up, as well as the nervous symptoms, and her hearing gained three feet without treatment. Tonsillectomy had previously been performed.

TABLE 3.—*Case 3, Miss N. E. G. F.*

R		L
2/25	W. V.	2/25
75″/15″	Rinne	40″/14″
	512 C^2	
—	Weber	—
N	U. L.	N
32	L. L.	32

Mr. J. H. L. (Case 4), aged 43, had had the condition in the right ear for ten years; in the left ear for six months. Tinnitus was continuous. The diagnosis was nerve deafness.

Two teachers from the head of their department in otology told him six years ago that he had nerve deafness and nothing could be done. Hearing test

made as he was getting over an acute exacerbation, revealed B. B. T. dull and lusterless.

The left side of the nose showed chronic disease of the antrum and ethmoiditis, with the history of repeated exacerbations which the patient felt was the cause of his deafness. There was absence of bone conduction in the left ear following an acute toxic process.

TABLE 4.—*Case 4, Jan. 22, 1923*

R		L
1/25	W. V.	1/2/25
9″/7″	Rinne	10″/0″
	512 C²	
	Weber›	+
N	U. L.	N
32	L. L.	64

The patient in the fifth case had an operation performed in the left antrum, and ethmoid exenteration, after two months' treatment. The Wassermann reaction was negative. The patient went eighteen months without treatment, and with the hearing becoming more acute. He then had the influenza and his hearing dropped to 3/25 in the left ear.

TABLE 5.—*Case 5, July 1, 1923*

R		L
3/25	W. V.	20/25
11″/8″	Rinne	24″/6″
	512 C²	
	Weber›	+
N	U. L.	N
64	L. L.	64

Mr. A., aged 38, had a condition diagnosed as sixth nerve deafness. On April 6, 1922, following an acute infection there was pain over the right eye. The right canal and auricle were swollen, and the hearing was impaired. The patient could not retain food, and was in bed for four days. On getting up he could not walk without support and was dizzy. Tinnitus was marked. May 10, one month later, a professor of otology made a diagnosis of 8th nerve deafness. June 16, the patient was examined by the writer. He complained of pressure in his ear and an unstable condition. The tinnitus was like escaping steam. Slight vertigo, not influenced by position of the head, was present. The Bárány test was negative. The diagnosis was 8th nerve deafness. Right chronic antrum with polypoid degeneration. Operation on the right radical antrum was performed. On October 17, the whispered voice had increased to 9/25. Bone conduction unchanged. On October 25, the hearing was normal and has remained so since.

Mrs. W. H. N. (case 6), aged 56, had had the condition for one year (?). She had had head noises for years; A. D.: Eff. O. N. S.; A. S.: O. M. C. C. There was a tendency for the hearing to become equal, and bone conduction was lowered, as shown in table 6.

TABLE 6.—*Case 6, Mrs. W. H. N.*

R		L
1/25	W. V.	1/25
60″/25″	Rinne	75″/17″
	512 C^2	
—	Weber	—
N	U. L.	N
32	L. L.	32

Mr. McB. (case 7), aged 28, had had the condition for five years; A. D.: O. M. C. C.; A. S.: Eff. O. M. A. Different middle ear conditions had the same effect on the end-organ.

TABLE 7.—*Mr. McB.*

R		L
1/2/25	W. V.	1/2/25
16″/13″	Rinne	10″/14″
	512 C^2	
—	Weber	—
N	U. L.	N
128	L. L.	128

Mrs. J. (case 8), aged 31, had had the condition for five years; B.: Eff. O. M. S. There was a tendency for the hearing to become the same in both ears as the case progressed.

TABLE 8.—*Case 8, Mrs. J.*

R		L
10/25	W. V.	10/25
70″/45″	Rinne	80″/50″
	512 C^2	
+	<Weber	
N	U. L.	N
32	L. L.	32

Miss A. R. (case 9), aged 51, had had bilateral nerve deafness for five years. Following tonsillectomy and without inflation the hearing returned in the right ear.

TABLE 9.—*Case 9, Miss A. R.*

April 22, 1924			*Oct. 17, 1924*		
R		L	R		L
5/25	W. V.	4/25	25/25	W. V.	16/25
35″/16″	Rinne	40″/15″	50″/35″	Rinne	35″/16″
	512 C^2			512 C^2	
—	Weber	—	—	Weber	—
N	U. L.	N	N	U. L.	N
32	L. L.	64	32	L. L.	32

Book Reviews

PHYSIOTHERAPY IN DISEASES OF THE EYE, EAR, NOSE AND THROAT WITH CHAPTERS ON SOME BORDERLINE AFFECTIONS. By ABRAHAM R. HOLLENDER, M.D., and MAURICE H. COTTLE, M.D. Price, $5. New York: The Macmillan Company, 1926.

This timely contribution will be welcomed by physicians practicing in these special fields, for it is a serious effort to present in a rational manner the possibilities as well as the limitations of this method of treating disease of the eye, ear, nose and throat. The mystery that always surrounds the use of the roentgen ray and radium emanations, as well as the use of electricity in any form, has made the use of such agents as physiotherapy particularly attractive to the medical charlatan. Witness the exploitation that has been carried on among those who are suffering from incurable deafness, the result of degenerative processes, by the irradiation of the pituitary body.

Physiotherapy in these special fields seems to find its greatest usefulness in the treatment of such serious diseases as malignant growths and tuberculosis. That there are several other conditions in which the application of this method of treatment may be beneficial seems hopeful.

The authors include in this volume the discussion of treatment for a number of conditions the usefulness of which has not as yet been definitely evaluated. The application of this form of treatment for the relief of such symptoms as tinnitus aurium and of such conditions as otosclerosis seems rather far-fetched, and the discussion seems to show a failure to grasp the significance of the actual changes that are known to exist in such conditions. One can approve of the tentative treatment by physiotherapy of many pathologic conditions, even though it may not be clear just how this treatment may be expected to alter the conditions. On the other hand, there is a limitation to any form of treatment. One can hardly recommend physiotherapy for the treatment of a hand that has been amputated, or for an organ of hearing in which there exists a defect resulting from degenerative processes. The perusal of the chapter on tinnitus aurium, as well as some other chapters, seems to leave the impression that the idea which the authors are attempting to convey is that when all other methods fail, then resort to physiotherapy for the reason that it seems incumbent on a physician to be doing something for his patient, even though the possibility of benefiting the patient seems extremely remote. Of course, if one persists indefinitely in the treatment of a symptom such as tinnitus aurium, he will be found treating the patient when the annoyance from the tinnitus undergoes those fluctuations that usually occur sooner or later, but because he is treating a patient at that time is no proof that the treatment has had any influence in causing the fluctuation in the symptoms.

The chapter devoted to the discussion of physiotherapy in the treatment of the tonsils will be appreciated by the throat specialist, because there has been a great deal of confusion regarding the claims for eradicating the tonsils through emanation treatment.

The references to a possible relationship between endocrine disturbances and the ear, nose and throat serves to indicate how unstable is our knowledge of the whole subject of physiotherapy, and seems to indicate that it will be some time yet before a final statement can be made regarding the value of

such treatment. Endocrinology, like physiotherapy, makes a special appeal to the charlatan who reads into the subject all manner of fantastic possibilities. When one begins to wax fervent over endocrine glands, it would be well to read the article by Professor Carlson on "The Relationship of Endocrine Glands to Disorders of the Ear, Nose and Throat" which appeared in the January, 1925, issue of the ARCHIVES OF OTOLARYNGOLOGY.

POLITZER'S TEXTBOOK ON THE DISEASES OF THE EAR. By MILTON J. BELLIN, M.D., PH.B. Ed. 6. Price, $10.00. Pp. 776. Philadelphia: Lea and Febiger, 1926.

It is a pleasure to see a new edition of this classic. For many years, the textbook by Adam Politzer has stood as the most important contribution to otologic literature. Politzer was not only a great clinician with excellent judgment of the various contributions on the diagnosis and treatment of ear diseases, he was first of all a careful student and investigator of the anatomy as well as of the pathology of the ear. His textbook includes, as no other text on the ear, an historical perspective of the important contributions that have been made to this subject. A careful perusal of this book should form a part of the preparation of every one who undertakes the responsibility of treating ear diseases. Such a study will give a perspective which will constitute a valuable background for understanding the more recent treatises on otology. The editor has aimed to make such additions to the earlier text as the more recent contributions warrant. In spite of this, the text as it stands does not constitute as complete a statement of the subject up-to-date as did the earlier editions. The preservation of the original illustrations seems justified. Although they do not compare with illustrations in more recent textbooks, they help to preserve the historical significance of the work.

LOCAL ANESTHESIA IN OTOLARYNGOLOGY AND RHINOLOGY. By JAMES JOSEPH KING, A.B., M.D., WITH SUPPLEMENT ON THE TOXIC EFFECTS OF LOCAL ANESTHETICS, CONTAINING THE COMPLETE REPORTS OF THE VARIOUS COMMITTEES OF THE AMERICAN MEDICAL ASSOCIATION MADE TO THE THERAPEUTIC RESEARCH COMMITTEE OF THE COUNCIL ON PHARMACY AND CHEMISTRY. Edited by EMIL MAYER, M.D., Chairman, Research Committee on Local Anesthesia. Preface by ROBERT A. HATCHER, M.D. Price, $5.00. Pp. 205. New York: Paul B. Hoeber, Inc., 1926.

This important (indexed) work fills a need which is appreciated by every one working in otolaryngology in which so many of the operative procedures are carried out with greater accuracy and greater safety to the patient under local rather than under general anesthesia. A complete bibliography setting forth the historic development of the use of local anesthetics in this special field has been compiled.

The well prepared chapter on technic, amply illustrated, will be of great value for men undertaking to work in this specialty.

Part II contains the valuable report of the committee on the disadvantages and advantages of the various local anesthetics in nose and throat, made to the Section of Laryngology, Otology and Rhinology of the American Medical Association, of which Dr. Emil Mayer is chairman.